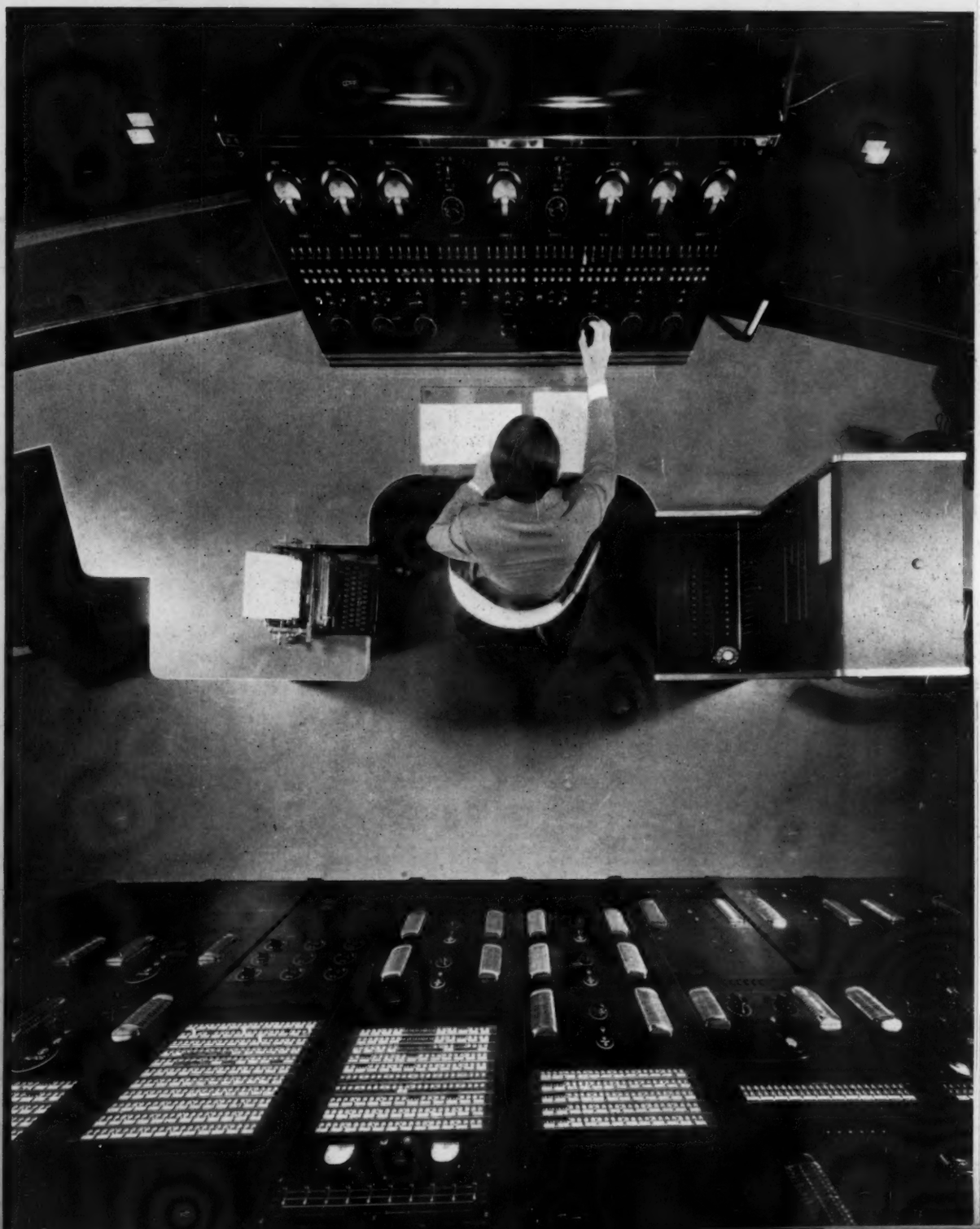
ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS



25c a Copy

SEPT.
1939

Gr w-Hill Co.
Calif.

SAVE
ON COOKING COSTS..
The minute you install an electric range in y
kitchen you start to participate in three import
savings which only an electric range can give y
1. LOWER ELECTRIC RATE. You get the benef
Edison's low wholesale domestic rate which redu
the average cost of all electricity used in your ho
2. LESS FOOD SHRINKAGE. The draftless elec
oven saves nearly 20% of the food weight whic
lost by shrinkage in the ordinary oven.
3. FEWER COOKING FAILURES. The many auto
tic features of an electric range insure against cc
ing and baking failures . . . less food is wasted.
In a recent sealed-meter test sponsored by
Edison Company, three days' meals for four pec
were prepared on an electric range at a total cos
only 19¼¢ for electricity. What other method cost
little and offers the additional adv
cleanliness and a coo
Now Get This Alumi Set for Y St
range because, in addi
terms, you get this fou
Ever Aluminum in exc or your old ste
Finest aluminum utensils with straight sides, flat
toms, snug covers and cool bakelite handles.
consists of chicken fryer and saucepans of two, th
and four-quart capacity. Retail value $14.25.
See the New Electric Ranges and This Alu
THIS FINE ALUMINUM SET IN EXCHANGE FOR YOUR OLD STOVE
NOW
et this four-piece aluminum cooking ensemble
hen you turn in your old stove for a new elec-
ic range! Included are a chicken fryer and
aucepans of two, three and four quart capacity.
hey are the famous Wearever brand, fashioned
f finest aluminum with straight sides, flat bottoms,
nug covers and cool bakelite handles. Their
etail value in $1 ou may have them in
xch you
A n electric ill point the way to
any cookin es. You will enjoy its
learn line of cooking speed, its
onven e, mode economy in price
nd ope n. When an electric range,
ou ren a lower electrical rate
ently used in your home.
Get your electric range now and take advan-
ge of this attractive Wearever offer.
Sold on Easy Terms
See Your Electrical Dealer Today
HE SALISBURY. A de luxe range at a moderate price.
ree Calrod units, Thrift Cooker, large baking and broil-
g oven, warming oven and two utility drawers. Full
orcelain enamel finish. Equipped with lamp, telechron
mer and condiment set.
HE WINDSOR. Hotpoint's value leader. Three Calrod
nits, Thrift Cooker, large oven with Hi-speed broiler,
id resisting porcelain enamel top, large utility drawer.
uipped with lamp, time chime and condiment set.
PROOF
THAT ELECTRIC COOKING COSTS LESS... A recent sealed-meter test
proves again the economy of electric cookery.
Nine ordinary meals were electrically pre-
pared for four people, under conditions pre-
vailing in the average home. The electric
range used was a popular standard make, of
the kind that is seeing daily service in thou-
sands of Southern California homes. A sepa-
rate meter attached to the range recorded the
amount of electricity used.
At the conclusion of the test, the cost of the
current was figured on the basis of the aver-
age rate paid for household service by
domestic customers.
The 1939 fine me
people cooked a total of
electricity. An electric range's thrifty
operation places its additional advantages of
cleanliness, coolness, convenience and de-
pendability within the reach of all.
The new 1939 electric ranges are offered to
you at lower prices and easier terms than ever
before. Buy now and take advantage of this
special offer.
SEE YOUR DEALER
36 MEALS COOKED FO 19¼¢
In sealed-meter test, three days' meals for four
people were cooked at an average cost of 2⅝¢
per meal...approximately ⅔¢ per person per meal.
HOTPOINT WINDSOR . . . TYPICAL OF 1939 ELECTRIC RANGE VALUES. Hotpoint's value leader. Three fast Calrod cooking units, thrift cooker, large oven with hi-speed broiler, acid-resisting porcelain top, large utility drawer. Equipped with lamp, time chime and condiment set.
Get This Fine Aluminum Set in Exchange for Your Old Stove. . You may have this four-piece set of famous Wear-Ever aluminum in exchange for your old stove when you buy a new electric range. The big chicken fryer and three covered sauce pans have a retail value of $14.25.
Sold on Easy Terms — See Your Electrical Dealer Today

BUILDING YOUR BUSINESS IS OUR BUSINESS

Increasing the use of electric appliances in the home is an important function of Edison advertising. A steady stream of promotion in newspapers, magazines, window displays, cooking schools, and direct mail constantly increases the public's acceptance of the electrical way of living and builds good prospects. Month after month, Edison advertising sets the stage for profitable selling by the appliance dealer.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

9-39

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Now a 15-kv Pyranol FILLED CURRENT TRANSFORMER

General Electric's Type KF-305

NOW, for the first time, you can get a 15-kv outdoor current transformer of the porcelain-shell type, Pyranol filled. With General Electric's new Type KF-305, these construction advantages—formerly available only in the higher ratings—have been extended to the 15-kv class.

Decreases Hazards

Pyranol is a G-E noninflammable, nonexplosive insulating liquid that is chemically stable—and the Type KF-305 is Pyranol filled. Pyranol has high dielectric strength. It will not sludge, and it presents no fire hazards. Furthermore, it's hermetically sealed in the case—no moisture can get in, no liquid can get out.

Smaller and Easy to Handle

The Type KF-305 transformer is small and easy to handle. Its porcelain-shell-type construction makes reduced dimensions possible. Its convenient shape simplifies mounting in the structural framework.

High Accuracy and Better Performance

Moreover, the new Type KF-305 meets the NEMA accuracy classification of $\frac{1}{4}$X, $\frac{1}{4}$Y, $\frac{1}{4}$Z and the 4.5-inch impulse test-gap requirements of the ASA. These are just two of the stringent tests that these new transformers pass in order to increase your assurance of a better, more dependable transformer.

For further information on the features of these new transformers, ask for our descriptive bulletin GEA-3264. You can get a copy by calling your nearest G-E office or writing General Electric, Schenectady, N. Y.

HEADQUARTERS FOR ELECTRICAL MEASUREMENT

GENERAL ELECTRIC

420-55

BETWEEN THIS MONTH'S COVERS

Credit Men Speak

EDUCATE YOUR PERSONNEL (p. 21): R. William Peterson, the author, credit manager of Puget Sound Power & Light argues for more attention to employee training. He tells about programs being followed in his company to assure cordial relations between contact employees and the public, particularly a "correspondence manual." W. E. Dame, author of "In Defense of Front Men," (p. 22), also is an accounting executive, being credit supervisor of Northwestern Electric. He is critical of the system which puts square pegs in round holes, thinks management as much to blame as front men for poor customer relations.

What Grounds?

MACHINE PROTECTION (p. 23): There is considerable variation from plant to plant in the way neutrals of rotating equipment are handled. That more uniformity should exist seems logical. J. H. Vivian, relay superintendent for Southern Calif. Edison, draws the general conclusion that units connected to the system through a delta-Y bank should have undergrounded neutrals and that potential measuring devices should be used. This is a PCEA report.

Hot Shadows

PHOTOGRAPHING HEAT (p. 27): In designing an electric heating unit or installation it is frequently desirable to know in advance what portion of the heat will be transferred by radiation, what by convection. Photographs of the shadows cast by heated air around the element provide a simple means of making the distinction. L. M. K. Boelter, a member of the University of California faculty, who describes the Schlieren method, is noted for his work there in illumination and heat transfer.

A Vacuum Wringer

BIG TRANSFORMERS DRIED IN THE FIELD (p. 28): Southern Cal Edison reports success with a vacuum tank which can be moved from plant to plant for drying power transformers. Has removed up to 19 gal. from one unit.

Keeping Plants in Trim

HYDRO MAINTENANCE (p. 29): As Western hydro plants grow older, maintenance becomes a more difficult job. Pooling maintenance experience helps cut costs. This PCEA report is by C. P. Rhine, who is division maintenance engineer for P G and E's San Joaquin Power Division.

Convention Harvest

INSPECTORS VOTE DOWN BARE NEUTRAL (p. 31): What happened to the proposed changes to the National Electrical Code requested by the Edison Electric Institute at the first test of inspector conventions is told in this convention report.

WIRING IS ACCELERATED (p. 33): Real hope is held out for the sick stepchild, Adequate Wiring, after the doctors responsible for its care from all parts of the West met in bedside consultation in the first regional Wiring Conference in San Francisco immediately following the more biological researches into the viscera of wiring by the inspectors associations. IES DISCUSSES FLUORESCENT LIGHTING, ETC. (p. 36): New light sources have worried the utilities but manufacturers seem to have answers to all the difficulties. Videology, the science of seeing, progresses with the accumulation of basic data on brightness. Highway lighting versus headlamps has advanced both. School lighting becomes a challenge to democracy

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Cover: Main control center for radio station KSFO and Columbia Network in San Francisco. (See page 50.)

in the eyes of a champion of both. (More about this convention is to follow in succeeding issues.)

Get-Together

LEAGUE MANAGERS MEET (p. 38): At the Western Merchandise Mart, San Francisco, Aug. 17, F. L. "Hock" Hockensmith of the Electrical League of Southern California, guided electric league managers and utility representatives through a specially prepared program. "Trade ethics and how far to go" proved to be the real topic of the day's discussion, with "education for salesmen" running a close second.

Soothing Customers

MUSIC MERCHANDISED (p. 46): Down in the May Music store in Albuquerque, N. M., progressive merchandising is bringing customers into the store. A student of customer psychology, manager Bernie May has streamlined his sales policy to give customers real comfort while they buy, or while they are put in a frame of mind to buy.

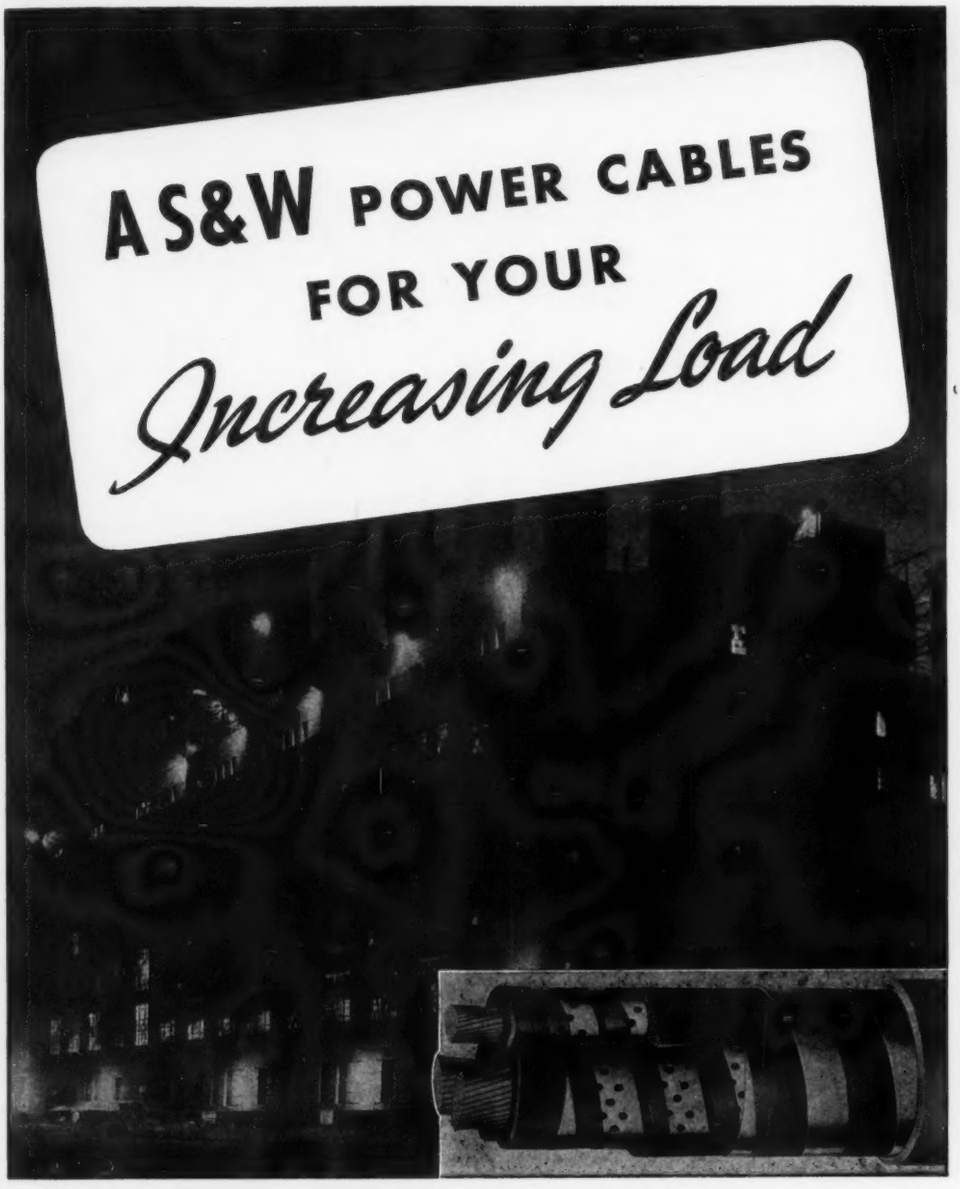
Let 'er Buck

RODEO BY ROBOPHONE (p. 54): Leonard W. Mitchell is associated with the Dinsdale Studios in San Francisco, being in charge of electronics. The animated rodeo he helped to create for the Levi Strauss clothes company at the Golden Gate International Exposition is drawing excellent crowds, who are enchanted at the clever caricatures of cowboy stars and rodeo principals one-third life size. O. A. Dinsdale carved the caricatures used on the June 1939 cover of ELECTRICAL WEST.

It Happened

NEWS OF THE INDUSTRY (p. 58): Provo, Utah city officials run into difficulties with citizens' suits against municipal power distribution . . . Scrugham Bill shelved until next session of Congress . . . Utah Power & Light Co. rate cut ordered . . . PUDS urged for Central Valleys project . . . Coast Utilities play war games in warning service rehearsal against "invading enemy" planes . . . Dr. Raver appointed new Bonneville project administrator . . . Doerr named new P G and E general sales manager.

AS&W POWER CABLES FOR YOUR *Increasing Load*

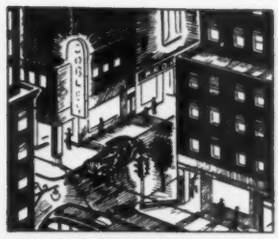


BENEATH the busy streets of nearly every large city in America, miles of AS&W paper insulated power cables help to carry the streams of energy that activate the wheels of industry and turn night into day. Their high repute has been earned by years of faithful service.

Made in a strictly modern plant provided with well-manned research laboratories and with every facility for test and inspection, AS&W cables are under close manufacturing control from the first operation to the last. All latest improvements in design, construction and method are utilized in their manufacture — Compack strand, Superdense paper, the "gas-washing" process of impregnation, non-migrating saturants, gas-blanketed lead pots, and many other features.

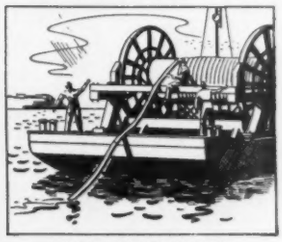
Standard AS&W paper insulated cables conform in all respects with requirements of latest AEIC specifications, prepared by the Association of Edison Illuminating Companies in consultation with IPCEA (Insulated Power Cable Engineers Association).

ADEQUATE WIRING SERVES AND SAVES



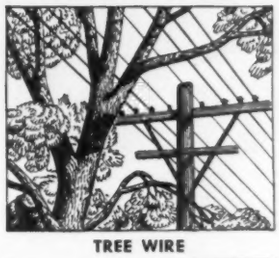
AMARINE NETWORK CABLES

VARNISHED CAMBRIC CABLES



SUBMARINE CABLES

AMERBESTOS CABLES



TREE WIRE

RELIANCE WEATHERPROOF WIRES

COLUMBIA STEEL COMPANY, *San Francisco, Pacific Coast Distributors of Electrical Cords & Cables*

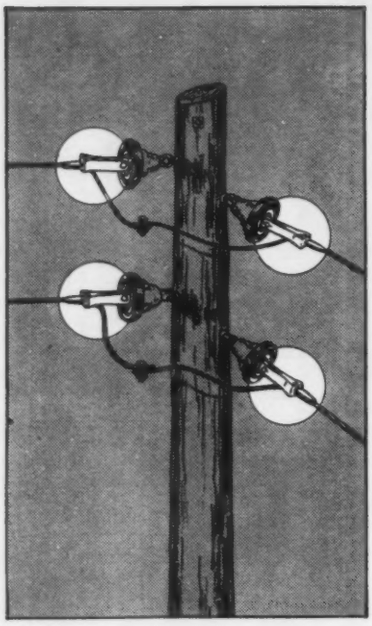
Manufactured by

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Modernize
YOUR DISTRIBUTION PRACTICE—



Primary dead ending with

Reliable Straight-Thru Dead Ends

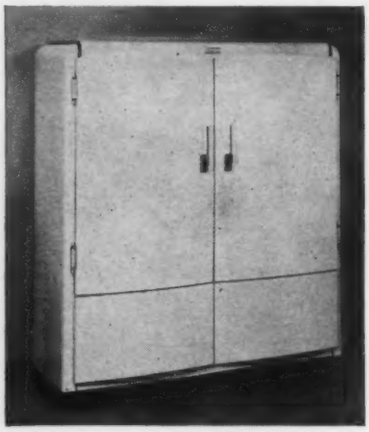
● RELIABLE STRAIGHT-THRU DEAD ENDS with rigid clevis make convenient, low cost and high strength connections to disc insulators. The end of the wire can be fed through the unit and used as a jumper—very convenient for pulling slack. The dead end cartridge has same design features and advantages as the standard Reliable Straight-line Splice.

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES
3145 CARROLL AVENUE • CHICAGO ILLINOIS

NEW PRODUCTS

Refrigerators (901)

Westinghouse merchandising division has added four new refrigerator models to its 1939 line. One of these, the all-porcelain Emperor, E-200-39, shown here, has a net storage space of 20.1 cu. ft. Shelf space is 34.4 sq. ft. With an ice producing capacity of 26 lb., this model includes two sliding meat keepers, one



built-in full-width Humidrawer and two thermometers, one on each door. Ice cubes freeze in less than an hour, and the twin power mechanism is full hermetically sealed.

Downlites (902)

"Downlites" are an ideal form of illumination for lofty interiors where good light is desired at the floor and reflected light only desired on walls and ceilings. Developed by the Rambusch Designers and Craftsmen, these lights offer minimum operating and maintenance costs. Open aperture permits relamping from below and promotes upward dissipation of heat through ventilation. "Downlites" may be used effectively with "shovels."

Oil Current Breaker (903)

A new switchboard type oil current breaker, capable of wide application to central station and industrial service, has been developed by Allis-Chalmers Mfg. Co. Designated as type KD-20, this 50,000 Kva. interrupting rating breaker has three poles arranged one behind the other. It is equipped with large butt type arcing contacts. The main current carrying contacts, silver-plated, are of the wedge and finger type for 600 amp. and wedge and laminated brush type for 1200 and 2000 amp. It is also arranged for flat surface mounting or for mounting in cells, switchhouses, cubicles, metal clad switching equipment and safety enclosed switchboards.

Weatherproof Outlet (904)

A weatherproof outlet has been introduced by the Bryant Electric Co. With a plate and cover made of brass, cadmium finished, this outlet is supplied with a rubber gasket which fits between mounting surface and plate. The outlet cover clamps into position with a quarter turn.

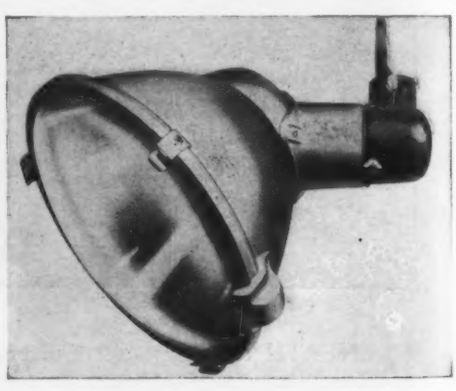
Metal Spray Gun (905)

A new metal spray gun, the "Speedmaster" has been developed by the Master Metal Spray Co. It is a high capacity unit, designed to spray efficiently all metals that can be ob-

tained in wire or rod form. This gun has extra heavy bronze gears, all shafts ball-bearing mounted and self-lubricated. Its power is impulse type, curved bucket turbine with throttle control for variable speed range.

Floodlight (906)

For floodlighting sports areas, service stations, industrial yards, etc., a new floodlight has been introduced by Westinghouse Electric & Mfg. Co. It can use 750-, 1000- or 1500-watt lamps. An optional cover glass that allows easy access is swivelled at the top



of the reflector and held by a nickel-plated copper-alloy ring. Maximum light is assured by use of vertical-burning lamps, and easily cleaned Alzak-processed aluminum reflectors.

Motor Watchman (907)

A De-ion motor watchman manually operated across-the-line starters for controlling grinding wheels, drill presses, fans, pumps, blowers, riveting and stapling machines and other electrical drives has been introduced by Westinghouse. A small size is applied to motors of up to two h.p.; a larger size is used for those up to 7½ h.p. Positive indication of "on" "off," or "tripped" position is provided by an indicating toggle switch recessed within the cover to prevent accidental operation. A snap-action bi-metal disc gives accurate overload protection and automatically disconnects the motor from the line before heat can damage the windings. Easy installation is assured.

$50,000 Substation Investment Postponed

HOW AN OHIO UTILITY PROFITED FROM THE USE OF PYRANOL CAPACITORS TO IMPROVE POWER-FACTOR

Capacity was needed

In 1937, growing load on the substation and feeders serving the downtown area of Warren, Ohio, made it necessary for the Ohio Public Service Company to provide additional capacity. A study showed that the location and layout of the existing substation would not permit the addition of new capacity at the station. To expand facilities would have required the building of a new substation on the other side of town—the only place where a suitable site was obtainable.

Capacitors were applied

Further analysis showed that this investment could be forestalled, and profitable handling of the load growth assured for one year, by an installation of shunt capacitors on the feeders. Such an installation, by improving power-factor, would release capacity that was loaded with reactive kva.

Subsequently, a total of 360 kva of G-E Pyranol capacitors was installed, resulting in the release of 206 kva of existing substation capacity. The installed cost of the capacitors was $3325.

The resulting profit

Since the saving in carrying charges on the forestalled substation investment was $6500 in the first year, the capacitors fully paid for themselves in about seven months.

This was entirely aside from savings on other items, such as the generating and feeder capacity released for new load, and the increased revenue which resulted.

Investigate for yourself

Opportunities exist on most systems today for the profitable application of G-E Pyranol capacitors. If there are overloaded substations or feeders on your system, it will pay you to investigate this economical, reliable means of releasing capacity. Reduced voltage drop and reduced losses are other benefits that usually follow the installation of capacitors. Ask your G-E representative for complete information, or write for Bulletin GEA-2746, *Pyranol Capacitors for Central Station Applications*. Address General Electric Company, Dept. 6—201, Schenectady, N. Y.

HOW RELIABILITY IS BUILT INTO PYRANOL CAPACITORS

Thorough testing of G-E Pyranol capacitors during the entire manufacturing process is a major reason for the reliability of these units in service. In the test illustrated at the right, the units are placed in a special oven, where the effectiveness of their hermetic sealing is tested by a combination of pressure and high temperature.

The G-E ten-million-volt lightning demonstration at the New York World's Fair uses 102 Pyranol capacitors, each rated 100,000 volts

GENERAL ELECTRIC

360-143

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- Nut hinges on bolt—swings open for installation — is guided back squarely on threads and starts easily. It cannot drop.
- 100% Duronze, a silicon bronze actually stronger than steel and more non-corrosive than pure copper or commercial bronze.

INSIST ON BLACKBURN

JASPER BLACKBURN PRODUCTS CORP.

Main and Clinton Sts. St. Louis, Mo.

Crapo GALVANIZED PRODUCTS

STEEL STRAND

Telephone and Telegraph Wire

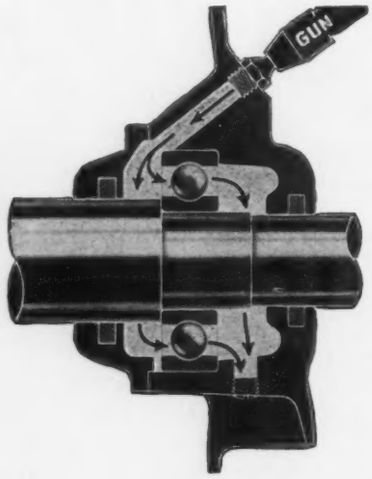
Crapo Galvanized Wire and Steel Strand can be spliced and served without injury to the heavy, protective zinc coating. The perfect adhesion of this tough, ductile coating to the wire enables it to withstand sharp bending and twisting, produces corrosion-resisting joints, makes for longer life, lower maintenance costs.

Crapo Galvanized Seven-wire Steel Strand and Telephone Wire are readily available in all standard grades and sizes from representative Supply Jobbers.

INDIANA STEEL & WIRE CO.
MUNCIE, • INDIANA

Lubriflush (908)

After electrical motors are operated for several months, it is desirable to purge the bearing chamber of the old lubricant. U. S. Electrical Motors, Inc., have devised a new method of lubrication known as "Lubriflush." Through a duct leading from the outside of the motor, new lubricant is injected in the inner side of the bearing with a pressure



gun. A drain is placed on the opposite side of the bearing underneath. The grease fitting and drain plug are easily accessible. This new method prevents the retention of sludgy substances and residue.

Tea Maker (909)

The ideal tea maker has been introduced by the Silex Co. The new Silex Spray Tea Maker consists of an ordinary glass coffee maker lower bowl—a special vented upper bowl—and a spray tube. Boiling water is sprayed down on top of tea leaves, and the brewed tea is drawn down automatically to the lower bowl, where it may be kept at drinking temperature. This ingenious device is electrically equipped.

Welding Machine (910)

A small arc welding machine, designed especially for machine shops, contractors, etc., is announced by the Lincoln Electric Co. This new machine makes it possible to minimize first costs in equipping for arc welding. Known as the "Shield-Arc Junior," this welder generates a smooth current for a wide variety of arc welding applications. It is rated at 200 amp. with a current range of 60 to 250 amp., 30-volt arc. It has a dual continuous voltage and current control.

Magnetic Relay (911)

A thermo-magnetic relay, designed especially for motor, generator and transformer protection, has been introduced by the Roller-Smith Co. The instantaneous element operates on any overload condition, while the current transformer, integrally mounted, reduces normal relay operating current to .4 amp., which is all that is required to operate the thermal element. Molded studs afford ease in mounting and wiring.

Business Men BANK BY MAIL

Many out-of-town business men use our Bank-by-Mail Service for the advantages which this strong, metropolitan Bank affords. No matter where they live, this service is as convenient to them as the nearest mail box.

Write today...

for free Bank-by-Mail kit containing all necessary forms, return envelope and simple instructions.

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California's Oldest National Bank

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No. 605
B-M INDENTER

B-M CONNECTORS and COUPLINGS

No lost time or complicated installation troubles with B-M Connectors and Couplings—that's the reason for their popularity with so many contractors. Just two squeezes on the handles of the B-M Indenter and the B-M Connector or Coupling is securely fastened to the Electrical Metallic Tubing. You save enough on your first job to pay for the B-M Indenter.

Our tools and methods are patented and we limit the license of our tools to the installation of our fittings only. Listed by Underwriters' — see your wholesaler or write for further details.

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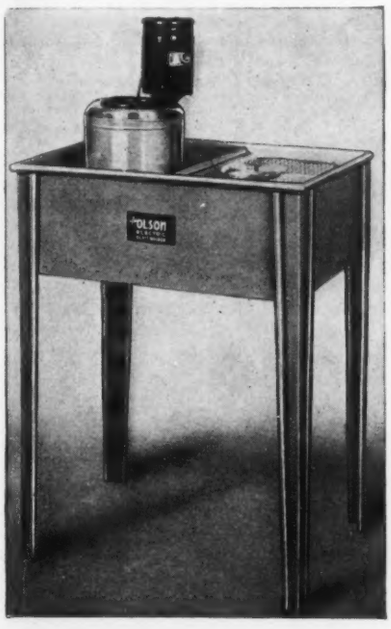
GALVA, ILLINOIS

Glass Washer (912)

Capable of washing 800 glasses an hour, the new electric glass washer of Olson Mfg. Co. has revolving brushes that clean both the inside and outside of the glass. This stainless steel washer is operated by being placed in a sink with 4 to 6 in. of water. The center



of the inside brush is hollow and a continuous stream of water is forced upward and out over the top of the brushes. No towelling is necessary. It is manufactured in both cabinet and portable models.

Coupling Capacitor (913)

A new larger type CA Carrier Current Coupling Capacitor has been introduced by Cornell-Dubilier Electric Corp. The capacitors are constructed with galvanized malleable iron mounting flanges so that they may be stacked for series, high voltage connections. The base and top are sealed to afford leakproof service. Individual units are made up to 46 Kv., but may be stacked to operate at any desired voltage.

Terminal Boards (914)

The use of rubber in place of fibre in motor terminal boards simplifies sealing of motor leads and cuts costs of outlet box. Reliance Electric & Engineering Co., has developed rubber board, ⅛ in. thick, which is heat-resisting, and punched with proper-sized holes to pass conduit outlet box screws and motor leads. Holes are kept small enough to produce a water-tight seal around the cables.

Signalling Transformers (915)

A new line of heavy duty type signalling transformers has been announced by The Acme Electric & Mfg. Co. For the conversion of 115 volt primary to 4, 8, 12, 16, 20 and 24 volt low voltage supply operating bells, gongs, horns, sirens, signalling systems, relays, control systems, etc., these transformers have high silicon, low-loss steel cores, and vacuum impregnated, hand finished coils, completely sealed in compound that is unaffected by high room temperatures, moisture or cold. The transformers are available in 50, 100, 250, 500, 750 volt-amp. capacity.

Voltage Regulator (916)

A new alternator voltage regulator to permit regulation of large a.c. generators, has been announced by Ward Leonard Electric Co. This new commutating unit and contact bar makes it possible to handle synchronous generators up to 2000 kva., 3 phase, 60 cycles.

Circulating Heater (917)

New fan-forced electric circulating heaters have been made available by the Noblitt-Sparks Industries Inc. These Arvin electric heaters have been completely redesigned. All four models operate on 110 to 125 volts a.c., 50 to 60 cycle. Heating elements are nichrome helical coils with molded porcelain supports. Motors are induction type, with two blade propellor fan. Deluxe models are finished in attractive enamels with chromium grilles.

Clothes Dryer (918)

A new tumbler clothes dryer, designed to make the home laundry process completely automatic, has been introduced by General Electric. The dryer, finished in two coats of baked white enamel, utilizes electric heat, and clothes placed in it are tumbled slowly about through pools of warm air by the action of a revolving cylinder, driven by a ¼ h.p. G-E motor. The capacity of the drying cylinder is 7 lb. of dry clothes. The dryer consumes 4600 watts per hour and has a rating of 220 volts, 21½ amp.

Terminal (919)

An electrical terminal to accomodate a range of wire or cable sizes has been announced by the Burndy Engineering Co. A one-piece assembly means that there are no loose parts

to become lost. The pressure strip prevents the clamping screw from damaging the conductor. The entire connector is timed to prevent corrosion and discoloration. It is made for all conductor sizes from No. 14 to 4/0.

Water Heater

A new two-gallon, non-pressure type model has been added to the Westinghouse water heater line for 1939. This new heater is designed for sale to rural, commercial and minimum bill customers. The heater may be quickly and easily installed at the point of use. The 1250-watt Corox heating element brings the water to 145°F. in 20 min., and an adjustable thermostat, permits a water temperature variance of from 120 to 170°F. The tank is insulated with glass wool, and is finished in white Dulux.

SPECIAL OFFER ON

TOASTSWELL

Automatic Waffle Baker

$1.00 TRADE-IN ALLOWANCE

REGULAR LIST PRICE **$9.95**

Special Trade-in Price **$8.95**

For six weeks beginning September 15th, 1939, Toastswell will allow a $1.00 trade-in allowance on any old waffle baker towards the purchase of a new Toastswell Automatic Waffle Baker.

Here's a golden opportunity to build the biggest waffle baker business you have ever had. Toastswell Automatic Waffle Bakers are a big value at the regular price and will be gobbled up at this special, trade-in price before you know it—so act fast if you want a slice of the extra waffle baker business that will be available this waffle season.

This trade-in offer expires

OCTOBER 31st, 1939

so be sure to place your order with your jobber at once or write us for complete details.

TOASTSWELL

2 and 4 Slice

Automatic Toasters

with
Selective Automatic Lift

NO. 791. 2 SLICE **$10.95**

NO. 795 4 SLICE **$15.00**

Also available in non-automatic models.

These great toasters are breaking sales records every day because Toastswell offers the biggest automatic toaster value on the market today. No other automatic toaster is available in 2 and 4 slice capacity and at their low list prices Toastswell Automatic Toasters will sell in volume with a minimum of sales effort.

See your jobber on the entire Toastswell line or write us for complete details.

UTILITY ELECTRIC CO.

620 TOWER GROVE AVE., ST. LOUIS, MO.

PRODUCT DATA

Keep Posted for 1c

Your being right up-to-the-minute may have an important bearing on your success. New developments are appearing daily in your field—tools to help you do a better job. Are you abreast of them? You fall back a step when the other fellow is well informed about a subject of which you are ignorant. Manufacturers' publications are a quick, efficient way for you to keep posted on current events in your field.

Isn't it a bargain to invest 1c (the cost of a postcard) to help yourself achieve the increases in earning power to which you look forward? American industry is offering a remarkable service—free. ELECTRICAL WEST makes it easy for you to enjoy this service for your own: Check and mail the coupon below. That's all you have to do help yourself toward better performance and greater rewards.

Interference Filters (920)

Radio interference filters are described in detail in an 8-page catalog issued by Grinnell-Dubilier Electric Corp. Including the most effective types of filters and spark suppression devices for various applications, this publication should be of considerable assistance to the engineer, serviceman or electrician in selecting the proper type filter.

Loom Motors (927)

Totally enclosed loom motors of one-half to 2 h.p. are described in a new Westinghouse booklet. These motors are for 220-, 440- or 550-volt power supply, 60 cycles, two and three phase. A new Westinghouse loom switch is also featured.

Monel (922)

Monel and other high nickel alloys produced by the International Nickel Co. are technically outlined in a new folder containing basic information on mechanical, corrosion-resistant and other properties of Monel and Rolled Nickel, "Z" Nickel, Inconel and various castings.

All-Round Motor (923)

A general purpose motor in 1/4 and 1/3 h. p. ratings is outlined in a new Westinghouse booklet. Ready to plug in any home or workshop outlet, this motor will operate grinding wheels, small lathes, drills and saws, replace washing machine or home appliance power units, at low cost. A special high starting torque enables it to start loads amounting to as much as 2½ times the running and operating load.

Switchgear (924)

"Vertical Lift Metal Clad" and "Indoor Cubicle Type Switchgear" are described in two new bulletins issued by Allis-Chalmers. The first publication covers the advantages, construction details and uses applying to this trend in highly developed switchgear. New safety features, full page dimension sheets and circuit diagrams will be helpful to the engineer in his station planning. Installation views, dimension sheets and wiring diagrams form the "Indoor Cubicle" booklet. Application and construction data are also given.

X-Ray Hotpoint ($25)

An X-Ray presentation of Hotpoint's Automatic Electric Ranges is introduced in a clever new catalog. To show the "real inner quality behind the outward beauty, we'll build the Range before your eyes," Hotpoint says, and they do in four easy turns of the page. The Hi-Speed Calrod is also thoroughly presented, together with many other Hotpoint features and accessories.

Lightning Protection (926)

"Lightning Protection at Lightning Speed with O-B Control Gaps," is a new bulletin published by Ohio Brass Co. This broadside discusses the problem of protecting stations from lightning, tells what objectives were sought in O-B control gaps design, explains how they work, points out best installation, and gives complete catalog information.

SOMETHING **NEW** IN RESISTORS

NEW VITROHM, the enamel now used in the manufacture of all Ward Leonard Resistors, has a crazeless structure that has been tested and proven to more than meet the requirements to withstand humidity, moisture, and immersion. Available in all sizes and types. Write for full information. Ask for Resistor Bulletin 11.

WARD LEONARD
ELECTRIC COMPANY
48 SOUTH STREET, MOUNT VERNON, N.Y.
Electric Control Devices Since 1892

Air Circuit Breakers (927)

"Air Circuit Breakers" and "Portable Instruments" are the subjects of two new catalogs by the Roller-Smith Co. The former incorporates complete and up-to-date, general and technical data on the Roller-Smith line of Type HD Air Circuit Breakers. The latter covers a.c. and d.c. portable instruments in detail, complete with technical information and illustrations.

Carrier Catalog (928)

A 1939-40 condensed catalog of air conditioning, refrigeration and heating equipment is presented by Carrier Corp. A cross-index is provided according to application and type of equipment. Ample rating charts are included to assist in the selection of sizes of machines.

Transformer Guide (929)

"Replacement Transformer Guide" is a new 32-page book which will be of particular value to radio service men. Issued by the Jefferson Electric Co., this guide gives data on all radio receivers marketed during the past decade, and replacement power, audio, transformers and chokes designated for easy selection.

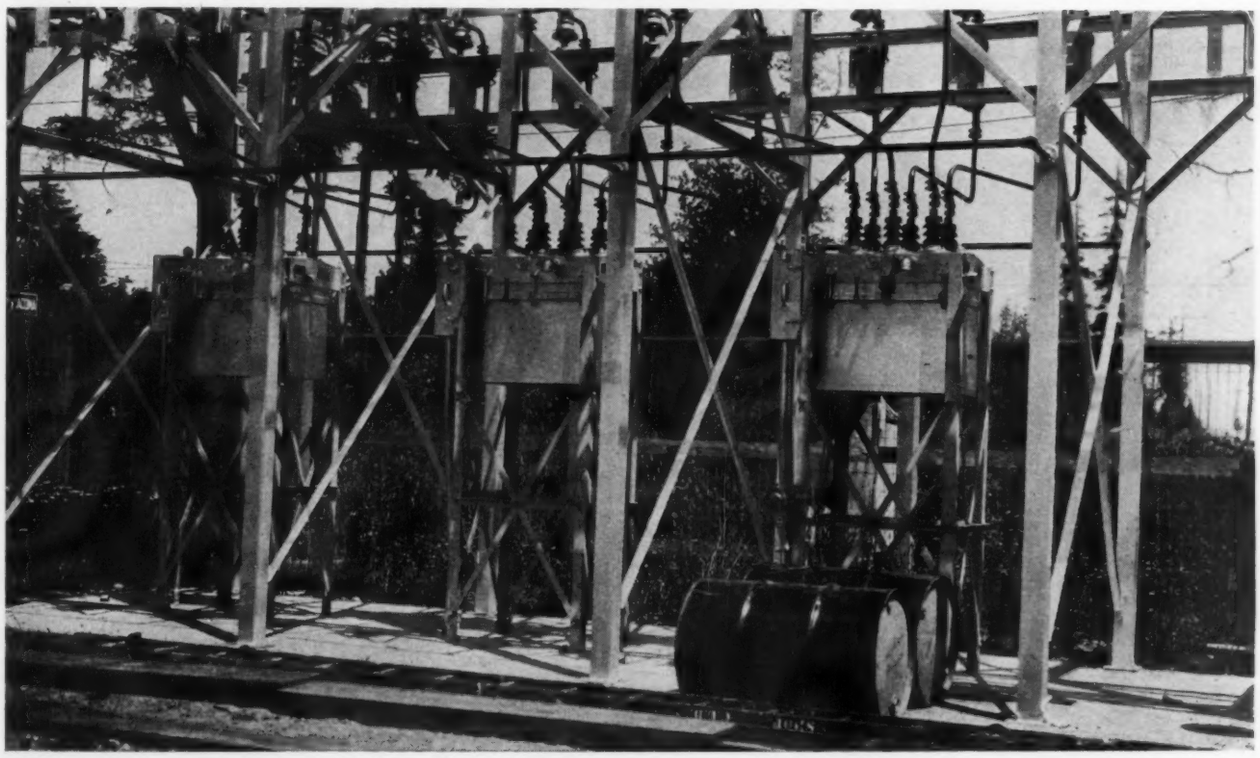
Sensitive Cell (930)

"Light-Sensitive Cell" of the blocking-layer type, is discussed in a new bulletin by General Electric. Application, cell construction, atmospheric effects, and technical data make this 8-page catalog complete. Diagrams show the various cell characteristics.

OVERLOAD PROTECTION WITH SAFETY!

—at LOW COST

Type AKE-25, 7.5 kv., 400 and 600 amps. Type AKE-40, 15 kv., 600 amps.



Recent installation in Tacoma, Wash., of three Type AKE-25 breakers with Type DM-1 Hand Control

Pacific Electric breakers offer safety through fast arc extinguishment.

Pacific Electric breakers clear faults quickly. The exclusive Expulsion Chambers and Spring-Operating Mechanisms assure that. Breakers of ordinary design, skimped in quality of materials and workmanship, may carbonize oil quickly, burn contacts, emit flame and cause outages and expense to you. But Pacific Electric's 33 years of specialized experience can be relied upon for positive fault protection. Scores of utilities praise these breakers for safe, sure operation and low maintenance.

Moreover, here's low first cost, a saving on installation costs and a saving of space. Get complete details and see for yourself.

You have no expensive operating power supply or costly wiring—you can use either our low-power demand (AC or DC) Spring-Actuated Motor Control of the Hand-Operated Mechanism which trips automatically but is closed by hand. These controls do save money.

Yes, here is more protection, more value for your money.

Send for Details Now

Pacific Electric Mfg. Corporation.

5815 THIRD ST., SAN FRANCISCO, CALIF. DUNES HIGHWAY, GARY, INDIANA

Representatives in Principal Cities

VENTED STEM permits complete filling.
Aerial lug clamps directly to stem.
CAPILLARY SOLDERED JOINT
Spun Copper Cap flared to provide for expansion and contraction
SOLDERED PORCELAIN ... a metal-to-porcelain joint, vacuum and pressure-tight ... stronger than the porcelain itself.

Noteworthy in Design and Performance ....

GENERAL CABLE

STREAMLINED *gasketless* TYPE SS TERMINALS

GENERAL CABLE GENERAL CABLE GENERAL CABLE

A gasketless terminal for medium and high voltage cable ... Soldered joints, throughout, result in a vacuum and pressure-tight assembly. Gasketed and cemented joints are eliminated ... The stem is vented along its axis to permit complete filling ... Type SS terminals are simple in design, positive in performance, and permanent in operation.

Write for Data Sheet on standard sizes of Indoor and Outdoor types.

GENERAL CABLE

General Cable Corporation Sales Offices: ATLANTA • BOSTON • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT KANSAS CITY (MO.) • LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROME (N. Y.) • ST. LOUIS • SAN FRANCISCO • SEATTLE • WASHINGTON (D. C.)

Electric Furnaces (931)

Electric furnaces are thoroughly covered in four new bulletins by the Ajax Electrothermic Corp. Installations, applications in schools and industries, facts about 1/8 lb. to 4 lb. high frequency melting furnaces and 3 kw. converter, and a general description of equipment together with information in high frequency heating for forging, hardening and brazing.

Magnet Wire (932)

"Magnet Wire and Coils" for every type of service is a 94-page catalog, completely revised from its first edition. It now gives greater information on magnet wire, its electrical and physical properties, and more space to magnet wire coils. This publication gives the history of copper wire to temperature conversion tables. Accompanying this book, is a small size pocket handbook, containing technical tables of information for shopman and engineer.

Dust Booklet (933)

"Dust the Destroyer" is a compact 24-page booklet issued by Cutler-Hammer, Inc., outlining "how to avoid his cost." Drawings to show how horizontal contacts collect dust, how vertical contacts stay clean. Booklet describes "better motor control for small motors," too, and lists the Cutler-Hammer line of motor controls.

Light Control (934)

"Finger Tip Light Control," introduced by the Miller Co., is thoroughly described in a new 28-page booklet that illustrates this new lighting technique. Beyond Finger Tip Light Control, which gives three different light intensities, the booklet lists the various types of Miller lamps, pointing out their many new features, including the "No Tip—No Teeter—No Mar Base."

Load Center (935)

"Nofuze Load Center" is a new Bryant Electric Co. publication, giving Nofuze types and application, information on "How to Select a Load Center," details on various types of load centers and a minimum wire size table.

Fluorescent Fixtures (936)

"Fluorescent Lamp Fixtures," is a revised new catalog issued by Daybrite Lighting, Inc., covering fixtures of all types for use with the new fluorescent lamp. Drafting table to showcase fixtures are included, together with detailed information as to particular lamp sizes, etc.

Kitchen Planning (937)

A "Kitchen Planning Manual" has been published by Westinghouse. Addressed to the trade, this manual is a practical book of kitchen planning fundamentals and standard kitchen plans for architects, kitchen engineers, builders and retailers of electric kitchens. It is divided into three parts, Fundamentals of Kitchen Planning, Individual Centers and Standard Kitchen Plans and Installation Data. Basic charts, new technical information, and standard kitchen plans are included.

Motor Starter (938)

A new magnetic motor starter is the subject of a recent General Electric booklet. Designed for machines, this new D-51 starter is ably dissected with a series of pictures. Forms and dimensions are also included.

Small Equipment (939)

"Tremendous Trifles" is a new booklet issued by The International Nickel Co., which emphasizes the importance of small equipment items, such as springs, bolts, electrical contact points, etc. This 16-page bulletin is full of illustrations and charts, with technical and mechanical data on nickel, Monel, Inconel and other nickel alloys. Problems of resistance to heat, vibration, corrosion, spark erosion and wear are discussed.

Connection Layouts (940)

In the September issue of "Haulage Ways," published by Ohio Brass Co., "Connection Layouts for Conveyor Mining in Gaseous Conditions" is ably discussed. O-B's fused gasproof junction boxes play their part in this interesting and instructive article. Diagrams show various uses, and methods of operating face conveyors, drills and cutting machines from two sizes of junction boxes.

Capacitor Motors (941)

"Capacitor Motors" is a new Westinghouse publication which outlines capacitor motors for 1/20 to 3/4 h. p. for unit heater, fan and blower applications. They may be used on either 110 or 220 volt supply. The booklet shows cutaway drawings, outline dimensions and typical installations.

SAVE TIME! USE THIS COUPON

To keep posted, simply circle the items in which you are interested, cut out the coupon (it can be pasted on the back of a postcard) and mail to:

ELECTRICAL WEST, 68 Post St., San Francisco, California
Please send me the following CIRCLED items:

901	902	903	904	905	906	907	908	909	910
911	912	913	914	915	916	917	918	919	920
921	922	923	924	925	926	927	928	929	930
931	932	933	934	935	936	937	938	939	940

Name..... Title*.....

Company* .....

Address .....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.

HERE IS a really HARD Rotary Drill you can safely recommend for any job!

SUDDEN DEPTH

For general use in hard materials, for drilling thru brick, tile, stone, marble, slate, etc., etc. you can't beat the PAINE SUDDEN DEPTH Rotary Drill.

Carboloy-tipped these drills will actually drill hundreds of holes in green brick, for example, without regrinding, and will produce a clean, unchipped hole with smooth sides.

Moreover, they are silent, doing away with the usual pounding and din of a Star Drill. They can be used in any ordinary electric drill or hand drill or drill press.

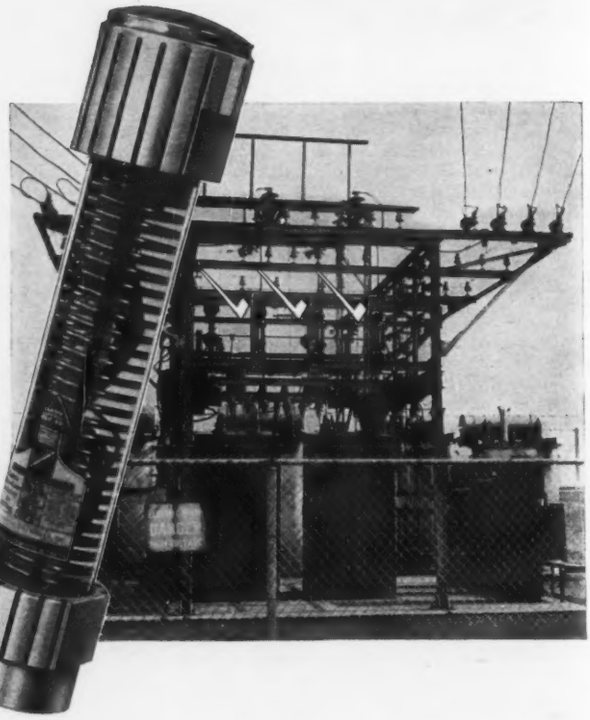
Write today for the Complete Paine Catalog showing extensive line of PAINE Toggle Bolts (18 types, each in 60 sizes), Lead and Steel Anchors, Installation and Building Specialties—each a guaranteed, improved item.

THE PAINE CO. 2975 Carroll Ave., Chicago, U.S.A.

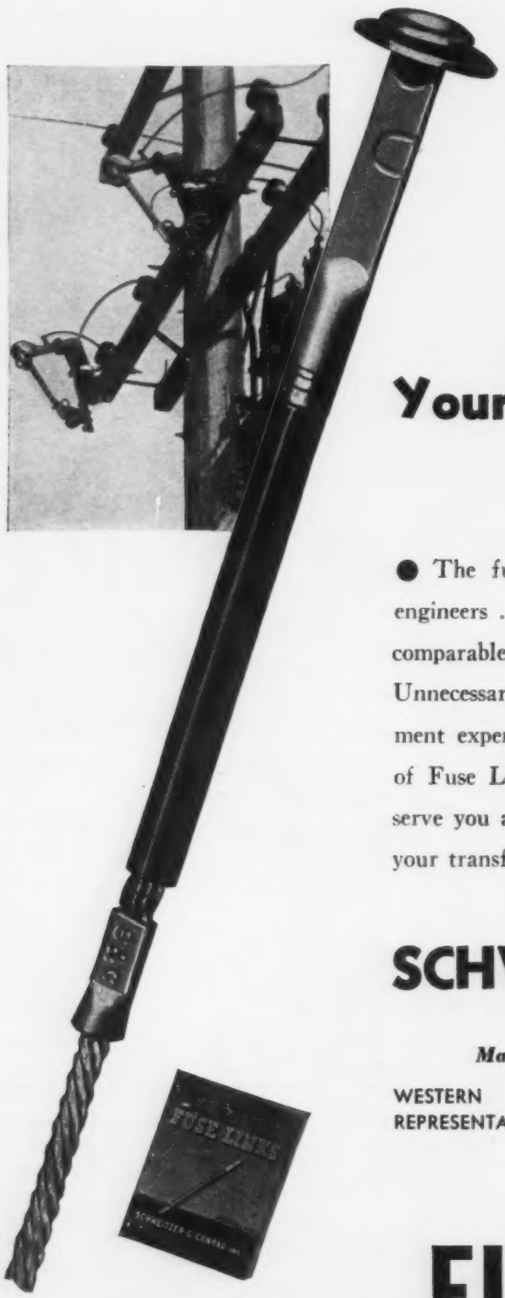
Drills:
TILE
SLATE
STONE
CONCRETE
BRICK
MOSAIC
MARBLE

Your Fuse Links

are just as important to your Distribution System



As . . . .



Write for our Bulletin 218 which explains the sound engineering back of S & C Links.

Your S&C LIQUID FUSES are to your Stations

● The fuse link is the heart of the cutout—a fact well recognized by engineers . . . S & C Fuse Links give you dependability, accuracy, economy comparable to the fusible element embodied in S & C Liquid Fuses . . . Unnecessary outages are reduced to a minimum—service call and replacement expenses are cut—maximum economy is assured . . . Yes, your choice of Fuse Links is worthy of your careful consideration. S & C Links will serve you as well on your distribution system as S & C Liquid Fuses do on your transformer stations.

SCHWEITZER & CONRAD, INC.

4435 Ravenswood Ave., Chicago, Ill.

Manufactured in Canada by Powerlite Devices, Ltd., Toronto, Ont.

WESTERN REPRESENTATIVES

SAN FRANCISCO — George E. Honn, 420 Market Street
LOS ANGELES — Farnham & Cunningham, Edison Bldg.
SEATTLE — T. S. Wood, 220 Ninth Avenue, North
SALT LAKE CITY — Riter Engineering Co., Kearns Bldg.

FUSE S&C LINKS

From Candle Light To Electric Light

From Flat To *Ribbed* Cross Arm Braces!!!

THIS WEATHER-TESTED BRACE HAS MADE NEW POLE LINE HISTORY

THE DEVELOPMENT of the safe, economical-to-use, RIBBED Cross Arm Brace has been a tremendous forward step in the evolution of more dependable, better constructed pole line hardware. Just as Edison revolutionized previous lighting methods with his own invention of the electric light, so Hubbard engineers have created a new era in utility line service and reduced maintenance expense by developing the cross arm brace with the built-in rib.

Tested by the severe strains and stresses of winter storms, this brace has proved its increased strength and added life, without extra weight. Under the worst conditions, snow-weighted lines, flood conditions, winds of hurricane velocity, the Hubbard RIBBED Cross Arm Brace has shown itself capable of carrying extra loads.

Utilities everywhere are using the RIBBED brace—NOT an ordinary brace from a blacksmith's anvil—but a scientifically designed, durable, weather-tested pole line product, the result of Hubbard's modern production facilities and over 50 years of specialized experience. The round ends afford protection for linemen in handling, installation and servicing.

For freedom from trouble and lower maintenance cost, replace damaged braces with the Hubbard RIBBED Cross Arm Brace. Take advantage of the forward march in pole line hardware construction as exemplified in this superior brace. Assure yourself of new gains in service life in ALL your pole line hardware, by specifying Hubbard products. You can get them at your nearest branch of the Graybar Electric Company or the General Electric Supply Corporation.

Hubbard and COMPANY

OAKLAND, CAL. PITTSBURGH CHICAGO

THE HARDWARE MAKES THE LINE... HUBBARD MAKES THE HARDWARE

REAL RELIABILITY

JEFFRIES

LARGE SIZE
AIR COOLED TRANSFORMERS

● Features that will save you money are to be found in large Jeffries air cooled indoor distribution transformers from 10 kva. to 50 kva. capacity. Well ventilated sheet steel cases and large air ducts in coils eliminate all hot spots and assure dependable continuous, and economical performance. Case construction is simplified for easy, quick installation. Write us today for details.

JEFFRIES TRANSFORMER COMPANY
5706 Long Beach Ave. Los Angeles, Calif.

LETTERS

Cover to Cover

DEAR SIRS:

I have attached order to cover subscriptions for ELECTRICAL WEST to be mailed to several of my associates.

I have been very keenly interested in your publication; in fact, it is one of the few papers I take time to check from cover to cover. Each issue has contained something interesting and useful . . . .

Will you please send me two copies of the July issue? I am especially interested in the story on page 20 about "Appliance Selling—College Taught." I am sure Dean Anders of Fenn College will be very much interested in reading your story in ELECTRICAL WEST. During the period from 1928 to 1932, I have made an unsuccessful attempt to introduce a course of Electrical Merchandising and Business Management as a part of the Fenn College program.

J. E. NORTH
President
Electrical League of Cleveland
Cleveland, Ohio.

Ammunition Ready

DEAR SIRS:

It may be entirely too late to be bringing this to your attention, but if it does not upset your editorial plans, I hope you can schedule another one of your Sales Guide sections on household washers and ironers for your October issue.

National Washer-Ironer Week will be observed from October 14 to 21 and I am sure that your touching up the laundering appliance subject in this way would be very helpful.

WILLIAM SHAW,
Chicago, Ill.

Sales Guides are only beneficial when the information they contain is put to work. In order to give dealers and their salesmen time to absorb the sales information on home laundries before the annual drive, the Washer-Ironer guide was published in August. By October we hope the industry's sales force will be ready for a real drive on laundry equipment.—ED.

Polyandrous Hussy

DEAR SIRS: For gosh sakes, who wrote Electra's Husband on page 43 of the June issue? It's a honey, and I've heard a number of favorable comments.

C. H. CUTTER
Pacific Electric Mfg. Co.,
Seattle, Wash.

Many are the requests to identify the sometimes jocular, sometimes sarcastic husband of Dame Electra. However, these gentlemen (Electra is a polyandrous hussy—her husbands numbering six or seven) prefer to remain anonymous. They are well known figures in the industry here in the West who feel that it would cramp their style if their identities were known.—ED.

VENT-A-HOOD . . . sensational new patented kitchen ventilator—not a fan—grease trap and centrifugal exhaust unit removes cooking odors from kitchen before they can invade other parts of the house—prevents greasy vapors from settling on walls—saves housework. Keeps kitchen cool. Biggest innovation since mechanical refrigeration. Selling by the hundreds wherever shown. Dealers and sales representatives wanted for unassigned territory—write or wire quick for literature and liberal proposition.

The VENTAHOOD Co.
2808 COMMERCE STREET
DALLAS, Dept. E TEXAS

CHROMALOX
the name that means
everything in electric heat!

Electric range units
●
Electric space heaters
●
Electric heat for all industrial needs

If you have a question on electric heat for any purpose, domestic or industrial, contact our nearest representative (below) or write us direct.

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MONTGOMERY BROTHERS
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1501 N. W. Kearny St., Portland, Ore.
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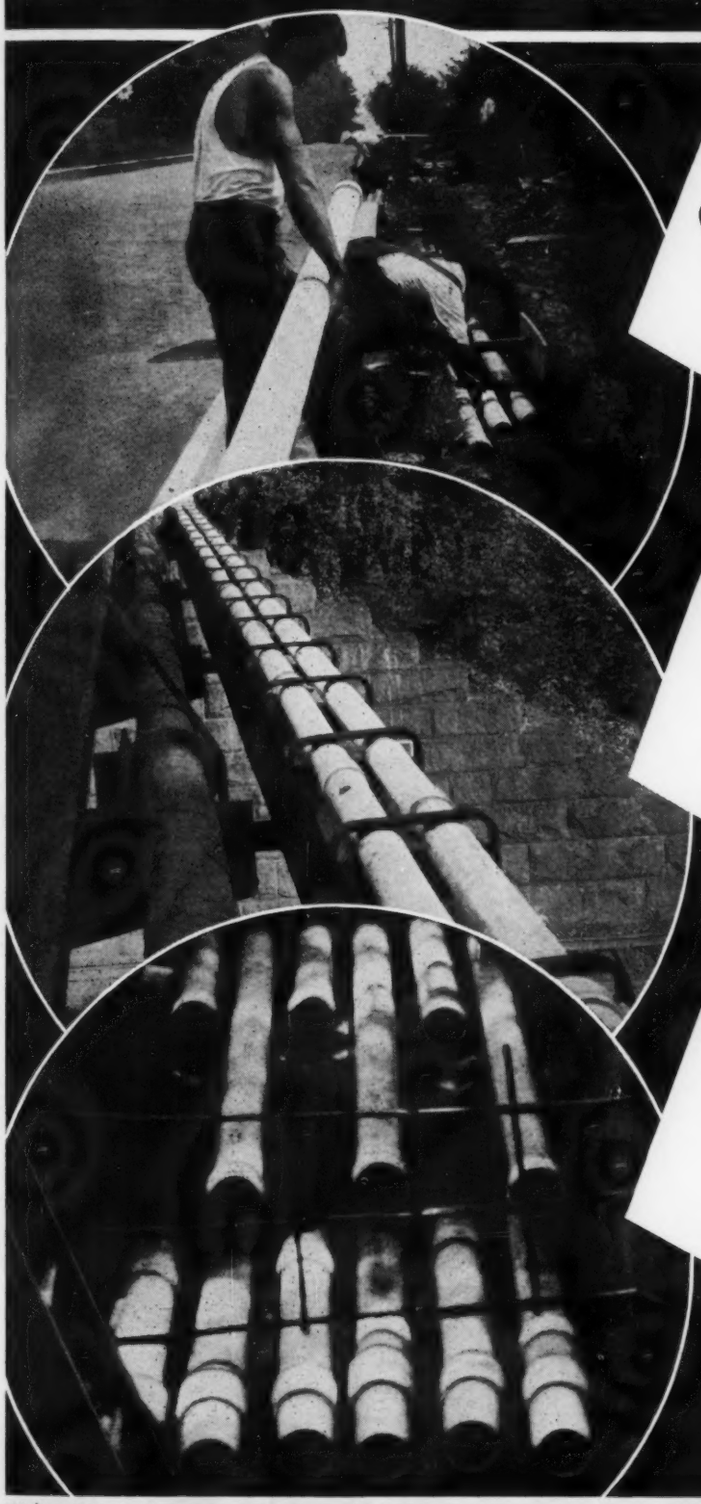
THE PETERSON COMPANY
1921 Blake St., Denver, Colo.
EDWIN L. WIEGAND CO.
7540 Thomas Blvd., Pittsburgh, Pa.

THIS DURABLE CONDUIT



COSTS LESS TO INSTALL

Uniformly strong and durable, J-M Transite Conduit retains its true form under sustained loads—requires no concrete envelope underground or in exposed locations. Its long light lengths are easily handled, rapidly installed.

COSTS LESS TO MAINTAIN

Made of asbestos and cement, Transite Conduit is highly resistant to smoke, acid fumes, weather and corrosive soils. It will not rust, rot or decay, is completely incombustible, offers unusual resistance to flame and arc. Maintenance costs are kept to a minimum.

RETAINS ITS SMOOTH BORE

The original smooth interior of Transite Conduit *stays* smooth in service. Joints are tight and snug—free from jagged obstructions. Therefore, cable pulling is easier—long pulls may be made without injuring the sheath—cables can be easily removed.

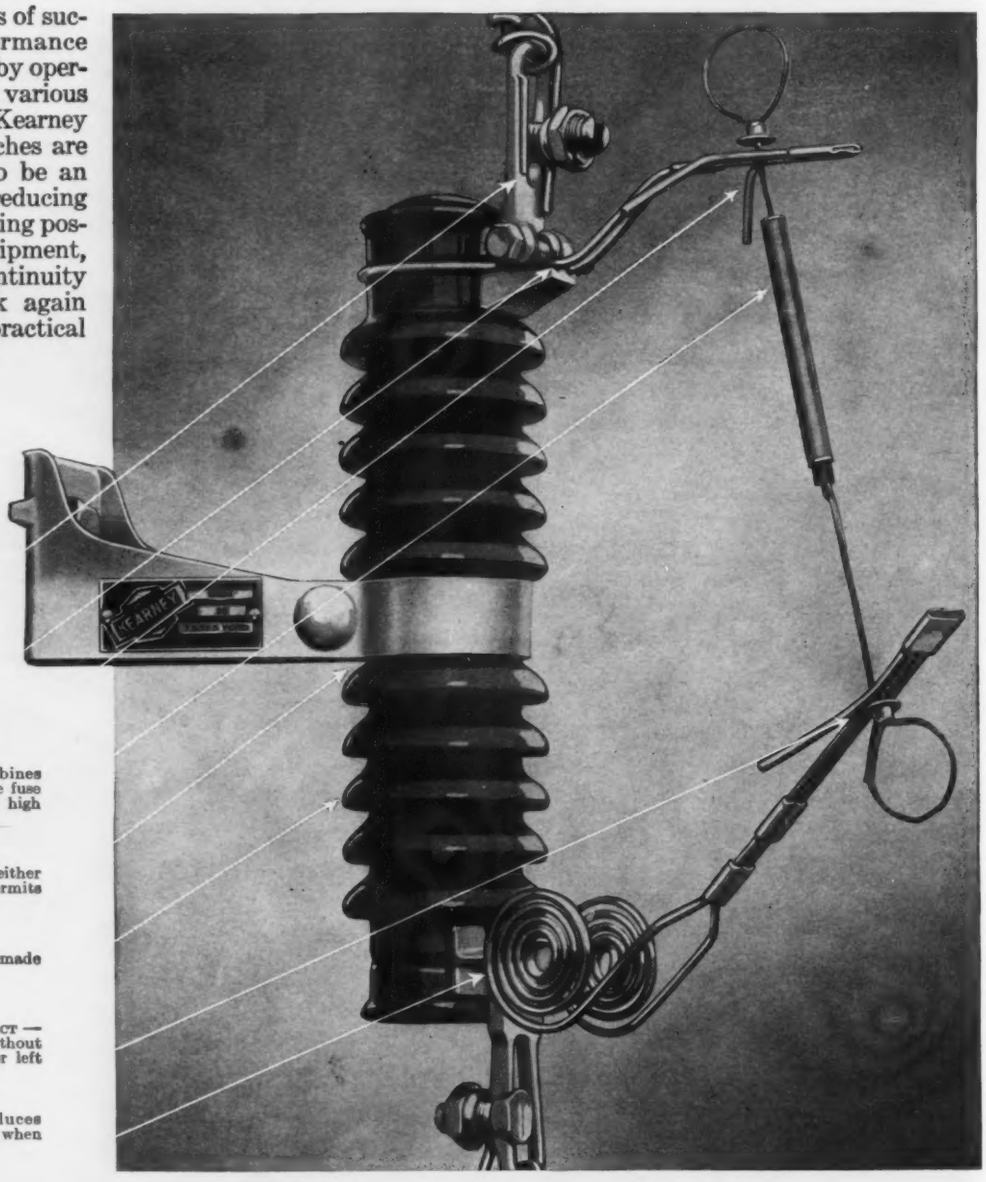
You should have complete information about Transite Conduit and its thinner-walled companion product, J-M Transite Korduct. Write for Brochure DS-410. Johns-Manville, 22 East 40th Street, New York, N.Y.

Johns-Manville TRANSITE CONDUIT

How to reduce rural line costs —by specifying KEARNEY

TRIP-O-LINK SWITCHES

NOW—after four years of successful field performance and careful observation by operating men, scattered in various sections of the country, Kearney Trip-O-Link Fuse Switches are definitely guaranteed to be an inexpensive means of reducing rural line costs, by affording positive protection to equipment, and assuring greater continuity of rural service. Check again this new departure in practical switch design—



featuring

DEAD END RING on upper terminal. Kearney Solderless Con-Nec-Tite used for upper and lower connections.

RESILIENT SUSPENSION MEMBER — made of Copperweld high strength spring rod; cushions short circuit impact.

POINT PRESSURE CONTACT—produces a pressure of approximately thirty pounds on the fuse body.

COMBINATION FUSE UNIT — combines conventional fuse cartridge with the fuse into a small, compact unit with high interrupting capacity.

ONE-PIECE HANGER—adaptable to either pole or crossarm mountings and permits swiveling of the insulator.

ONE-PIECE TUBULAR INSULATOR—made of extruded wet process porcelain.

DOUBLE POINT PRESSURE CONTACT — permits inspection of fuse in use without interruption of service and right or left hand installation.

LOWER CONTACT SPRING — produces quick separation of arcing terminals when the fuse blows.

For Better Maintenance and Construction—

Use **KEARNEY PRODUCTS**

EXCLUSIVE SALES REPRESENTATIVES **MAYDWELL & HARTZELL** INCORPORATED

LOS ANGELES • SAN FRANCISCO • PORTLAND • SEATTLE • PHOENIX • RENO • TACOMA • SPOKANE

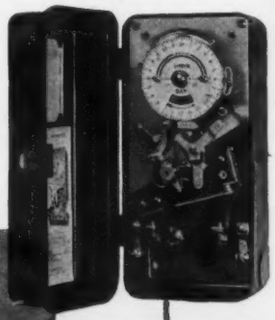
STREET LIGHTING CONTROL

MODERN

with SANGAMO ASTRONOMIC DIAL TIME-SWITCHES

Sangamo Astronomic Dial Time-Switches fulfill the exacting requirements for modern street lighting control. Three types of driving movements meet a wide range of service conditions. Two of these are for use on controlled frequency circuits: the straight synchronous motor drive, and the latest development, the synchronous motor drive with electrically wound carryover, which provides for operation of the switch during ordinary service interruptions. The third is the electrically wound movement with 20-hour carryover and full-jeweled escapement for either alternating or direct current service. Furnished for indoor or outdoor mounting, or, in certain types in the socket construction, Sangamo Astronomic Dial Time-Switches are available for any conceivable public lighting control application.

The ten-hour carryover feature of this Form VSWZ Astronomic Dial Time-Switch functions automatically during current interruptions. Normally, no re-setting is required the year around.



Automatic convenience at economical first-cost is provided by this Sangamo Form KAZ Astronomic Dial Time-Switch.

Model F, Form VSFZ Astronomic Dial Time-Switch in standard socket construction. Time can be set through opening in cover.

SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

ELECTRA'S HUSBAND

Sillier than the Pulps

"WHAT is that pulp magazine in which you have been so absorbed for the last hour?" Electra asked as we sat in our pleasant living room one August evening.

"It may have all the earmarks of a pulp magazine but actually it is the Congressional Record of August 4, 1939," I replied.

"Of all things!" Electra snorted, "With a houseful of good reading matter why waste your time on anything so dull as that?"

"Not all of it is dull," I remarked patiently. "By diligent search I can always find something to arouse my interest in this official record of the greatest legislative body in the world.

"For example, I have just been reading a radio address by the Honorable Harold Ickes. While the Record ostensibly contains only the official debates, there is a nice little parliamentary trick of introducing extraneous matter under the guise of 'extension of remarks' and Mr. Ickes' address enters these sacred pages through the courtesy of Representative Gearhart.

"In this particular oratorical outburst, Mr. Ickes is taking the people of California to task because some of our citizens have had the temerity to oppose the passage of the Pine Flat Bill. What aroused my interest was the concluding paragraph in which he said, 'If you let the Pine Flat Bill authorization go over until 1940, the appropriation will then go over until 1941, and who knows what the policies of the government will be in 1941? If you are lucky, you may have a Public Works program in operation into which Pine Flat will fit perfectly. If you are not lucky, you may have a rigid curtailment of Public Works and an administration hostile to public power projects.'

"Put in plain English, he is beseeching the people of California to come and get it now, while the getting is good. He intimates that it would be a fine thing for the Government to pay out twice as much as it takes in for years and years to come. He would like to see this sort of economic necromancy continue until every migrant dustbowler has an electric range in his piano-box shanty and every stockholder of every private power company has registered as a Democrat so that he may get on relief. Not until then —according to Mr. Ickes' philosophy—will the pee-pul be safe from the Power Trust.

"But now a cloud appears on the Honorable Harold's horizon. It may be no bigger than a man's hand, but Harold has a hunch that by 1940 said cloud may be large and wet. With fear in his heart and a flutter in his voice he cries to the people of California, 'Who knows what the policies of the government will be in 1941?' And the echoes from Michigan and Illinois and Pennsylvania and Ohio and other regions recently benefitting from Harold's vicarious munificence—all answer, 'Who knows?' "

"You are not very fond of Mr. Ickes, are you dear?" Electra commented in her sweetest manner.

"If I am not," I replied, "I am merely reflecting the attitude of a considerable number of citizens in the Golden State. They gave evidence of their profound disregard for Mr. Ickes when they refused to pass the Garrison Referendum last November and again this spring when the Assembly voted against a revival of this measure. Further evidence of their dislike for Mr. Ickes' meddling disposition was shown in the San Francisco election on a proposal for municipal ownership. In all three instances he had vigorously demanded that these measures be passed, and in reply, California—always the lady—said 'Nerts to you.'

"So far as Pine Flat is concerned, I think our people are competent to advise Congress concerning its merits and would be quite content if Mr. Ickes would keep his nose attached to his face and would keep his face in his imperial quarters in the new palace of the Department of Interior."

A MAN who is a specialist in the field of large expositions remarked about a year ago, "The era of big World's Fairs is passing." Attendance records at both New York and San Francisco seem to confirm his prophecy. I was talking with a smart man about this situation and his comment—at least so far as the San Francisco Fair is concerned—was that it appeals to people of good taste, and apparently there are not enough of that variety to crowd the turnstiles.

That is not a happy commentary on the educational system into which we have poured and continue to pour so many billions of dollars. One might think that the appreciation of sheer beauty and the interest in the amazing marvels of science would arouse more enthusiasm now that in 1893 when the Chicago fair was such a huge success—at least they should if we are better educated than the bucolic folk who flocked to Chicago.

Then the question is, "Are we, the 126 million who swarm the streets and highways of 1939, better educated than the 65 million who followed the plow or rode the streetcars in 1893?" I doubt it.

And so I am taking advantage of every opportunity to enjoy the majesty and charm and inspiration of Treasure Island. There may be no more great fairs. Certainly there will never be another like this! The wizards of architecture and horticulture and illumination have combined their talents to make this place one of the most beautiful man-made spots on the face of the globe.

And it is electricity that makes it great! P.W.A. may have hauled the mud to build the Island, but the grandeur of the superstructure grew from the minds and hearts of men raised in a school which prospered before the alphabetical agencies rose to adorn the shores of the Potomac.

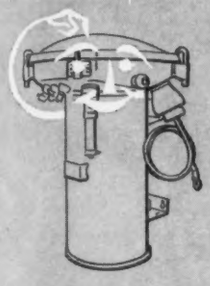
OFTIMES there is a whole sermon in a single sentence. A few nights ago Electra and I were showing an Eastern visitor some of the sights of our fair city. He was particularly interested in fluorescent lighting and we had been looking at several new installations. We happened to pass one of the city's busiest corners, occupied by one of those popular drug stores whose basic color scheme is orange. There were appliances in the window. A toaster for less than a dollar, an iron for slightly more. Our friend looked for a moment and then said:

"There is no bottom to low prices but there is a top to quality."

Nothing more was said, but as we walked on down the street toward the theater district I did a lot of thinking. A toaster that retails for $14.50 that has sold by the millions. Irons for which the public willingly pays $12.50. Isn't the sermon obvious?

C·S·P STOPS LIGHTNING LOSSES

C·S·P THINKS · TALKS · ACTS

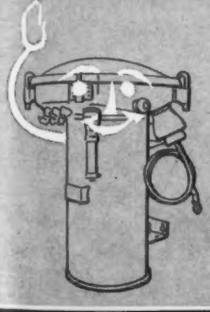


THINKS

C·S·P's protection against burnouts is selective. It permits any overload that does not exceed critical winding temperature. Permits use of excess transformer capacity and reduces maintenance expense.

TALKS

But C·S·P *tells* you when an overload condition exists. The overload signal light talks. It anticipates a service interruption and eliminates costly load surveys.



ACTS

If the temperature reaches dangerous proportions, or if a short circuit occurs, C·S·P *acts.* Its built-in breaker works automatically, to protect the transformer. Service is quickly restored by resetting — a one minute job that can be done from the ground.

. . . AND GIVES YOU THESE *EXTRA* ADVANTAGES

Think of the savings that come from cutting fuse outages 100% (no fuses with C·S·P), and from reducing maintenance to a few **pennies** per year per transformer. And don't overlook a saving in installation cost up to $7.50 per transformer, due to C·S·P's one-piece design.

Only C·S·P Transformers are . . .

1 Completely self-protected against lightning.

2 Completely self-protected against burnouts from short circuits.

3 Completely self-protected against burnouts from overloads.

4 Completely self-protected against service interruptions from fuse outages.

5 PLUS, simple, low-cost installation and lower maintenance cost, for every year of service.

★ ★ ★

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How many different cutouts do you carry?

SINGLE-ELEMENT door with selecting device for indication or dropout
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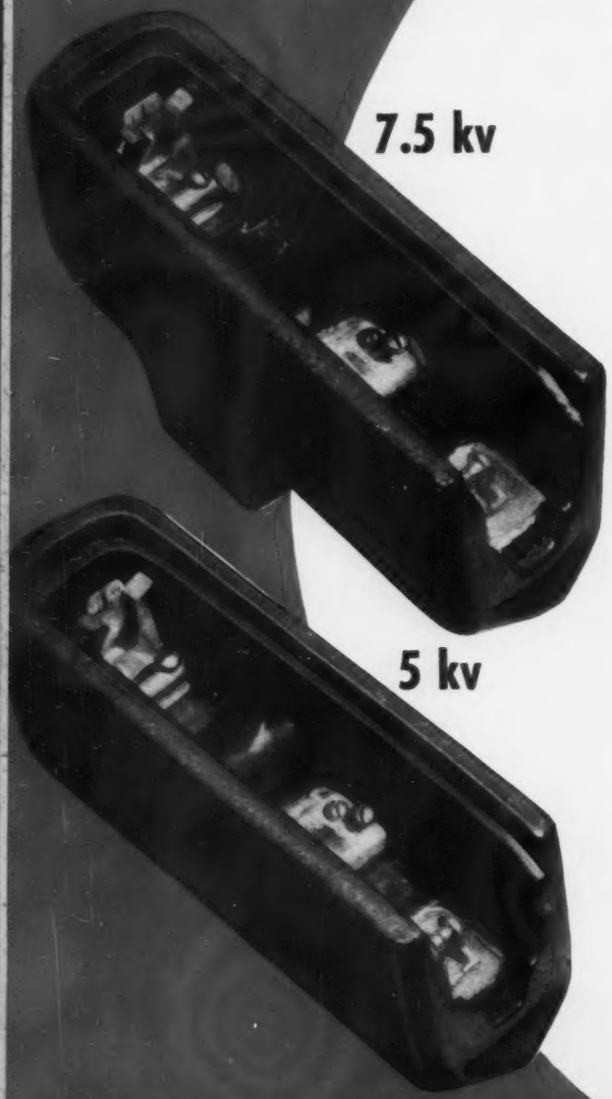
DISCONNECT door with indicating and isolating feature



These 3 doors and these 2 housings . . .

meet 80% of your cutout requirements

IF you are looking for an opportunity to cut costs through lower inventories, fewer parts to handle in the stock room, and greater flexibility of cutout application, then we have a message for you.

It's this: You can take care of 80 per cent of your distribution fuse cutout requirements with just five major parts.

And the best of it is that you can adopt this simple program very easily. You don't have to stock all five of these parts immediately. Here's the way you do it:

First: You buy our 50-amp indicating and dropout fuse cutout in the 5- and 7.5-kv ratings. (Perhaps you're doing that now.) This gives you two housings to take care of all voltages not exceeding 8 kv (13.2 kv, Gr Y) across any one cutout. The doors are identical and interchangeable.

Suppose you are ready to use reclosing cutouts at sectionalizing points, on branch circuits, or at transformers serving important customers or located in out-of-the-way places. You have already installed G-E indicating and dropout cutouts. All you do is to take a G-E two-element *reclosing door* and send out a trouble crew to change doors. No line crew required. No installation costs. And it's the lowest cost, expulsion type.

What about disconnects? Simply take our new-design disconnect door. This, too, fits both housings. Furthermore, it has an indicating and isolating feature that saves time and makes for greater safety.

Two housings and three types of doors. General Electric is the only manufacturer that offers this stock-reducing, money-saving combination. Why not look into it today? General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

340-3F

Educate Your Personnel

Employee Training Courses Will Give Industry Improved Personnel to Meet Changing Conditions

By R. Wm. Peterson*

DIPLOMATIC dealing with customers calls for specially trained employees. Utilities have spent unlimited time and millions of dollars perfecting wonderful plants, building better working equipment, and establishing super-efficient accounting systems. Of what use are all of these unless manpower is fully developed in keeping with this material progress? Such material achievements count for little in dealing with the public unless they are efficiently and effectively manned, because no system or operation can be more perfect than the individuals who work it.

Business of the future is facing keener competition, more regulations, increased financial burdens, and apparently a narrowing profit margin. One of the most effective ways to meet this situation is through improved personnel. The question is, how to improve personnel? The answer is to be found in employee training so that business may more strongly qualify itself to meet changing conditions—today, tomorrow and for years to come.

Course Divisions

Any employee training course logically divides itself into two main divisions, general and specific. First there is the broad foundation upon which to build general knowledge about a company and an industry. This basic information should be mastered by all employees regardless of their function. It is the foundation upon which all other specific training must be based. To meet this general requirement Puget Sound Power & Light Co. provides its employees with a "Know Your Company" program. This is carried on by the personal development committee, one of several groups operating under an employees' cooperative organization. Participation in this educational activity is purely voluntary. Employees are encouraged to attend evening meetings about once a month at which certain individuals present the story of their departmental operation. Some of the subjects covered are company history and financial structure; power supply and distribution; line and service department; commercial and suburban departments; accounting, credits and collections; budget, corporate and statistical operations, and purchasing advertising and personnel. These meetings are held in centrally located assembly halls and have been well attended. Pictures, charts, skits, papers and numerous speakers maintain diversity and interest and add effectiveness to the purpose of this general educational work.

After laying a broad base of general knowledge it is essential to set about building the educational pyramid through more specific courses aimed at specific groups of employees. Obviously the most important group is that which has the highest percentage of customer contacts. One such course in the Puget Sound company has been prepared for meter readers and collectors. Material for this course consists of a sizeable manual written in non-technical English, designed to enable employees readily to answer the average question of the average inquirer and to perform their work in the most efficient manner. The information is presented in classes conducted on company time with department heads, supervisors and other qualified persons acting as instructors. Consideration is being given to opening this course to the entire company personnel, brought about by a popular demand from employees not initially included for this instruction.

A form of specific training activity which has perhaps been more productive than anything thus far initiated in this company is the credit and collection correspondence manual. This was initiated in an endeavor to build up the quality of performance in credit and collection activity. It was realized that intelligent, fair and sympathetic correspondence was of paramount importance in maintaining satisfactory customer relations. A correspondence committee consisting of four credit and collection supervisors was appointed two years ago for the purpose of drafting a manual which now represents the combined efforts of many employees.

This manual was compiled from the "best letters of the month," from selected sentences and paragraphs and from authoritative information on letter writing. The index today includes such subdivisions as appreciation letters, closing bill letters, closing sentences or paragraphs, collection letters, deposit letters, discontinuance letters, letter analyses, merchandise letters, novelty collection letters, seasonal letters, and stockholder-customer letters. Each letter chosen for inclusion in the manual has been checked closely and tested for effectiveness.

As another practical refinement, each day in the Seattle credit department a file of carbon copies of all collection letters, which have been written and mailed the day before, is circulated over the supervisors' desks and each letter is analyzed for words and phrases which might detract from its effectiveness or which might not fully reflect company policy. Words such as, "compel," "enforce," "insist," "demand," unable," "impossible," and "handle" are some of the negatives which have been weeded out from correspondence as a consequence of daily vigilance and have been supplanted by words and phrases more affirmative and less objectionable to the customer.

Purpose of Manual

This manual is not necessarily a file of form letters; it is a step toward personalized correspondence with mass production. Although many of the letters may be used verbatim, it is not the intention to develop stereotyped usage. The prime purpose of the manual is to furnish the basic idea of approach and and a business terminology founded on company policy as related to credit and collection matters. As a natural consequence, it materially speeds up composition and increases volume. It aids all new employees engaged in credit and collection work properly to function from the first day on the job. It saves considerable time, assures uniformity in performance and keeps the staff constantly conscious of doing the best job possible. The manual has been especially helpful to the many suburban offices throughout the territory served where local managers may have other duties in addition to credits, collections, and customer accounting. Reference to the manual enables such an employee to write an effective letter in accordance with company policy which does not require a great deal of time and composition.

* Extracted from a report to the Accounting and Business Practice Section, Northwest Electric Light & Power Assn.

Not only has this correspondence manual put the company's credit and collection work on a positive and progressive basis, but it has been found to be a training course for employees in their daily contacts with customers. It has been one of the important factors responsible for improving collection results.

As never before, management and the public have been made aware of the economic and social responsibilities of business. Pressure is forcing the necessity for educational qualification on those responsible for business operation. Business today is a job that must be assumed by everyone connected with business right down the line. Everyone in business must become better informed if we are to carry on successfully the critically important job of demonstrating the good that business, and especially the utilities, have done in the past and can accomplish in the future.

In Defense of Front Men

By W. E. Dame

AN ARTICLE by W. T. Telligan entitled "Front Men," appearing in the ELECTRICAL WEST of December 1938 has been used numerous times, with very gratifying results, to impress our own "Front Men" that it is necessary for them to investigate thoroughly every complaint made by a customer. Electra's Husband in the July issue really "went to town" and it has prompted me to defend the "Front Men" as set forth in Mr. Telligan's article. I believe that the same defense could be offered for the so-called "Salesmen.

"Public Relations" have for some time been my hobby. The study of people placed in contact jobs and the manner in which they discharge their duties is really interesting and often educational. Whenever possible through conversation or inquiry, the manner of placement in the job was checked into. Our company is constantly trying to improve this part of its business, which of course tends to sharpen my quest for knowledge in this respect.

Several articles have appeared wherein conditions were discussed and training methods given, but as yet nothing that I have read digs deep enough, even though the cause and cure seem simple. It could be that we are waiting for a very difficult or technical solution backed by alphabetical impressiveness and academic reasoning. Or it may be because "The Management" of any firm dislikes the implication that they are at fault and we who are at present on the job have hesitated to call a spade a spade. My readers—from their personal knowledge—can probably call to mind any number of firms, who could have better "Public Relations" if they would review their policies regarding their personnel with the following taken into consideration.

It is unnecessary for anyone to enumerate the benefits of Mr. Telligan's article—every person who meets the public should read it. The real message was, I believe, for those persons charged with the responsibilities of directing corporations that deal with the public. These men, in all probability—if they read the article—commented most favorably upon it and yet overlooked entirely the subtle suggestions contained therein. Why? Because presidents, managers, etc. seem to believe—"It can't happen here." But it does, and there are a number of reasons for it happening. One reason, perhaps, is because it is so easy for the vice-president or general manager to handle a difficult situation that little thought is given the adverse possibilities were someone less capable or schooled to have a similar interview. Contacting the public is to them, most likely, a minor detail, yet it means as much to their company as any other function within their organization. Yet it does not receive the proper managerial attention. Many types of business today are carried along by their own momentum, and the results of poor personal contacts are not immediately evident.

Aside from the public relations angle, inefficient "Front Men" make necessary an unbelievable amount of work which would not be required were the "Front Men" measuring to a higher standard. The fault is in no way that of the "Front Men." In most cases they are nice, likeable fellows trying to make a living, and if it is possible to do so, they avoid trouble at all times. Almost everyone will give, as far as they are capable, efficient, courteous service, yet they may be wholly or partially unfitted for the job of intelligently and diplomatically administering to the wants of our public. We could go into all the little things that make an otherwise good man unfit for public contact work, but I will only mention a few to indicate just what I mean:

The man who always finishes what he is doing before acknowledging an interruption. The "wise-cracker" type. Another, who is efficient and thorough, but unfriendly. The argumentative person, or the excessively voluble one, who keeps customers long after business is transacted. The fellow who never listens and must have everything repeated. These are faults peculiar to people, and more often than not they cannot be changed.

While on the subject of qualifications, it might be well to mention *some* of the qualities a "Front Man" should have: good physical appearance; above the average conversationalist; that friendly, easy to get acquainted with, personality, and be endowed with that old fashioned quality of "horse sense."

It has been observed that in a great many organizations "Front Men" are very seldom picked because of their ability to do that particular job. A number are selected because they have been efficient at some other job over a period of years and now must be taken care of; others are a surplus from other branches or departments brought about by changes, some because they are available, many because they have influence enough to get a job but are not technically trained; and others, who are not fitted for this or any special work and are put at meeting the public—for why, Lord only knows.

Oftentimes several individuals may be delegated to wait upon Mr. and Mrs. Public in addition to some routine work, as in civil service. This may be commendable from a managerial viewpoint, but woefully short of fulfilling the demands of Mr. and Mrs. Public. True, a large number of contacts come through without a hitch regardless of who handles them, and these are, fortunately, in the majority. The management then, knowing this, makes an alibi for the selection of these men, anticipating that there will be a few sour contacts but willing to accept such a condition in order to justify the use of men not fitted for this particular job. The fault of poor public relations lies wholly at the door of the management, because they select the personnel or condone their selection by letting some subordinate make the appointments; and even though the management can be commended for later efforts in trying to train this personnel, greater things could be accomplished if they would begin at the beginning and select the right material. It may cost more, but it would be money well spent.

Machine Protection and the Practice of Grounding Neutrals

Here are terse answers to the main questions which arise in connection with the handling of neutrals on rotating equipment. Attracting keen interest, the paper is outstanding among those presented this year to the production-substation group of the Operating Economics Section, PCEA

By J. H. Vivian

WHETHER or how to ground generator neutrals has been a live question since generators were first built. Many articles have dealt with the subject, and all electrical men are familiar with the general theory.

No rule can be given as to whether the neutral of a machine should be solidly grounded, grounded through a resistor or reactor or left ungrounded, but it seems reasonable to expect more consistency than does exist among cases where conditions of operation are similar.

It is the purpose of this paper to review the subject so the problem may be discussed as a whole. References have been taken from *Silent Sentinels*, *Relay Handbook*, "Minimizing Fault Damages Within Generators," L. F. Hunt, *Electrical World*, Dec. 28, 1929, *Relay Systems*, Monseth and Robinson, manufacturers' catalogs, etc.

All phases of protection have been receiving more attention since apparatus has been getting larger, and, because of its effectiveness, differential protection is generally accepted as standard for large rotating equipment.

For complete protection, a large stator winding should be protected against phase-to-phase short circuits, shorted turns, open circuits and phase-to-ground faults. The ordinary differential scheme will not protect a machine if shorted turns develop or if one phase becomes open-circuited. However, many special differential schemes can be applied when full protection is desired.

The physical arrangement of coils in a stator makes it almost impossible to have a fault develop that will not cause the insulation to break down to the frame of the machine first. If the neutral is not grounded a fault of this sort will not unbalance the phase currents. Many protection engineers have considered it advisable to ground the neutral so that enough current will flow to operate differential relays when one phase-winding breaks down to ground. They have argued that if the neutral was ungrounded, the fault would have to develop into a phase-to-phase fault before it would be found.

Of course it is very desirable to detect a fault and disconnect the generator from the line before a phase-to-phase short circuit can develop, since this will reduce damage.

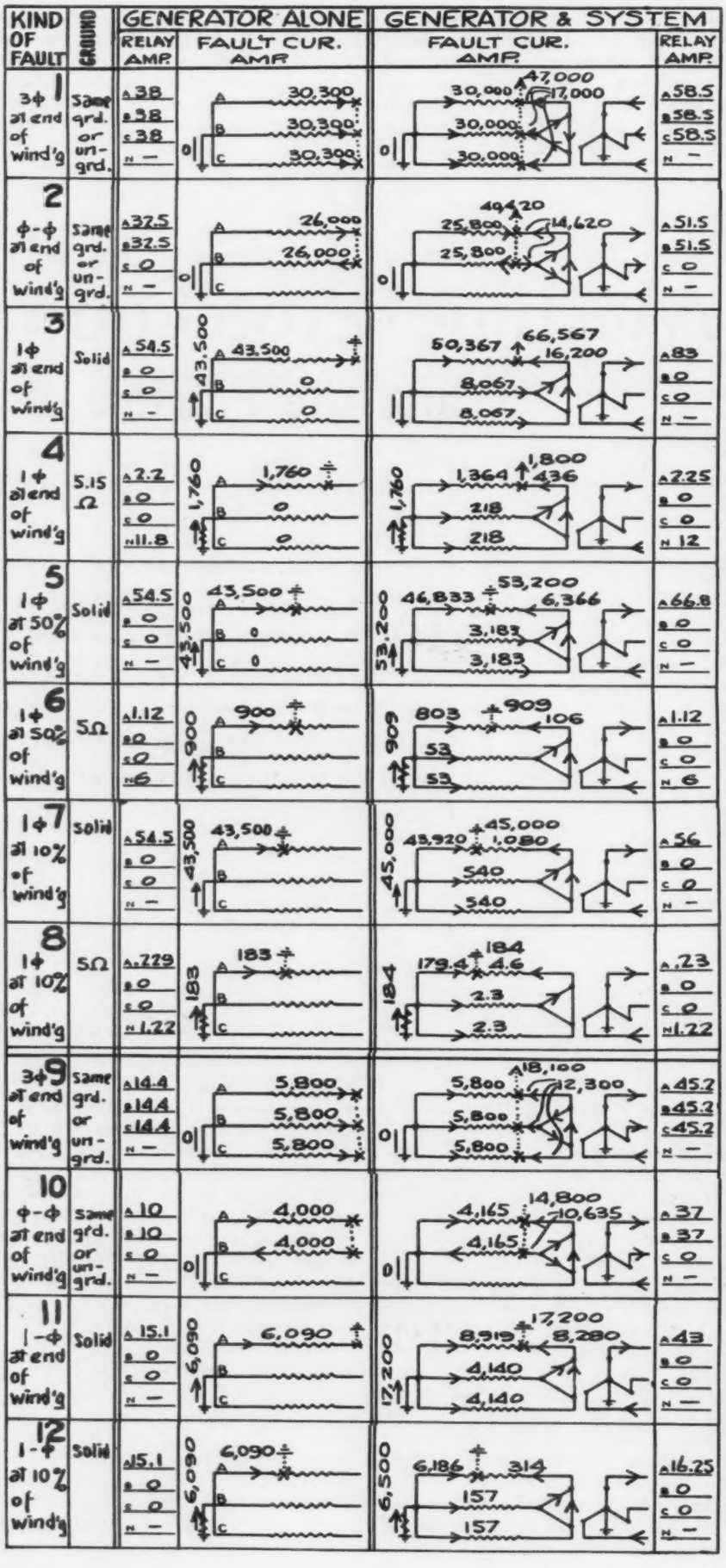
When a short circuit develops in stator windings, all sources of voltage should immediately be disconnected. First, the line breaker must be opened to prevent the system from supplying current to the short circuit. Second, the field breaker must be opened to prevent the machine from feeding its own short circuit. Third, if the neutral is grounded, a neutral breaker should be provided to prevent prolonged arcing because of: (1) the slow decay in field flux; (2) residual magnetism after the field breaker has opened. In practice, all breakers are operated simultaneously and without time delay interlocks of any kind.

Sensitive differential relays are now designed so they will not operate on through short circuits. They are known as percentage unbalance relays and will not operate unless the per-cent unbalance in the secondary currents exceeds the per-cent sensitivity tap rating of the relay. The minimum trip values rise as the through-fault current increases. For example, if the load causes 3 amp. to flow in each current transformer of one phase, an unbalance of 0.075 amp. would cause the relay to trip if it were set on the 2.5% tap. If the load caused 5 amp. to flow in each current transformer of one phase, an unbalance of 0.125 amp. would cause the relay to trip.

Although it requires only a few cycles completely to isolate a faulted machine by using differential protection, the currents are usually so high that it is impossible to prevent damage to iron and windings.

It is interesting to note how currents divide when a generator or condenser is short-circuited. One condition has been assumed where a 100,000 kva. generator, rated 16.5-kv. and having 11.6% positive-sequence reactance is connected through a delta-Y bank to a large system. The calculations were made by the use of symmetrical components on a 500,000-kva. base. The positive-sequence system reactance is then assumed to be 40%, the transformer positive-sequence reactance 62%, and the generator positive-sequence reactance 58%. Full-load current on 100,000-kva. base for generator equals 3,500 amp. Current transformers are chosen at 4,000/5.

Another condition was taken where a 28,000-kva. generator, rated 11.5-kv. and having 24% positive-sequence reactance is connected through a delta-Y bank to the same system at another location. Using the 500,000-kva. base, the system reactance is assumed to be 42%, transformer reactance is assumed to be .161%, the generator 429%. Full-load current on 28,000-kva. base



for generator equals 1,410 amp. Current transformers are chosen at 2,000/5.

Results appear in Fig. 1 and Table I. These were calculated as examples to indicate the problem of relaying generators and condensers when their armature windings become faulted. No attempt has been made to explain the various reactance values that are used depending on the transient short circuits.*

It should be noted that phase-to-ground fault-current values are high. This explains why considerable damage is usually done before a machine can be entirely disconnected from all voltage sources.

In 1929, an article in *Electrical World*, "Minimizing Fault Damage Within Generators," by L. F. Hunt, explained methods of operating generators with neutrals lifted. One of these, becoming popular now, is the ground-detector method. However, many questions arise when neutrals are lifted, and operating men hold different opinions. Following are some of the questions.

1. How does lifting the neutral affect stability?

Usually, it has nothing to do with stability; we find most of the generators and condensers of today wound Y, connected to the system through a delta-star transformer bank. Stability, therefore, particularly voltage stability, does not enter the discussion.

2. What happens if one phase winding breaks down to the frame of the machine?

Of course, the answer to this question must be given only after the method of detecting the fault is known, but let us discuss two types of ground detectors commonly used.

The first method is to connect three potential transformers star on the high side and to insert a relay in the corner of the delta on the low side. Usually a double-scale voltmeter is connected across the relay terminals.

In case of a ground fault on such an ungrounded system, the resultant of the phase-to-ground voltages is equal and opposite to three times the shift

* Anyone interested in this phase of the subject will find an excellent explanation in Chapter VI of *Relay Systems* by Monseth and Robinson.

Fig. 1—Calculations

Cases 1-8: 100,000-kva., 16.5-kv. generator; 11.6% phase sequence reactance (positive and negative); 1.0% zero phase sequence reactance; 3,500 amp. full load; 4,000/5 current transformers

Cases 9-12: 28,000-kva., 11.5-kv. generator; 24% positive phase sequence reactance; 37% negative phase sequence reactance; 8% zero phase sequence reactance; 1,410 amp. full load; 2,000/5 current transformers

in the system neutral with respect to ground potential. (See Fig. 2).

When generators are operated on one bus or when two generators are connected to one transformer bank, the trouble can be in any part of the circuit. With this type of detector it is necessary to eliminate trouble by eliminating one or more pieces of apparatus at a time. This method of detection is very sensitive, having a 3-1 ratio. It also has the advantage of being unaffected by third harmonics produced in generators. It requires three potential transformers having line-to-line ratings.

The second method consists of inserting a potential transformer between the neutral of the generator or condenser and ground. Potential transformers having line voltage ratings are normally used because they are more standard than those with line-to-neutral ratings, although neutral-to-ground-rated transformers are satisfactory. When one phase is solidly grounded, the maximum voltage obtainable is phase-to-ground voltage.

For example: An 11-kv. synchronous condenser having one 11,000/110-volt potential transformer connected from neutral to ground, has a maximum secondary voltage of

$$\frac{11{,}000}{\sqrt{3} \times 100} = 63.5 \text{ volts}$$

If a voltmeter is used it should be marked 100% ground at this point. A relay having 6.3 volts pickup would be sensitive for any ground above 10%. This percentage indicates that portion of the winding beginning from the neutral end.

This type of detector is normally used on unit systems, such as one rotating machine and one transformer bank. Even with two generators and one bank this method is less expensive because only two transformers are necessary. Furthermore, it is easier to locate faults when more than one detector is used.

3. How do harmonics affect machines when neutrals are lifted?

Voltages of harmonic frequencies are always generated in windings of synchronous machines because of the manner in which windings are distributed, the pitch of coils and breadth factor. Of all these harmonics the third and ninth are in phase in all windings of a three-phase generator. In addition to harmonics of this nature a third harmonic is generated by the second harmonic of the flux wave which in turn is produced by armature reaction of the loaded generator.

When two generators are paralleled on a bus and are unequally loaded, the vector difference between the third (and ninth) harmonic voltages generated in both machines will appear between the neutrals of the two machines. Therefore, if potential transformers are connected from neutral to ground, the third-harmonic voltage will be impressed across the two potential transformers in series. The ground detector of the three potential transformers should be preferable in this case as it will not be affected by third harmonics produced in the generator windings.*

It has been found by tests that voltage differences in the order of 300 volts, 150 cycles can be obtained between neutrals of the two generators. It is safe to assume that the voltages in the two machines separately are a little higher than this value. These voltages apply vectorily in the "neutral ground-detector scheme."

Relays set at 6.3 volts pick-up (equivalent to 630 volts primary setting) are well above the third-hormonic range of 300-350 volts.

* The theory of generation of harmonics in generators can be found in *Principles of Alternating Current Machinery*, by R. R. Lawrence, pp. 47-60.

Table I—Summary of Calculations

100,000-kva. Generator

Kind of Fault	Generator Alone (amp.)	Generator and System (amp.)	Solidly Grounded	Reactor in Ground
3-Phase End of Winding	30,300	47,000	●	●
Phase- " " " "	26,000	40,420	●	●
l- " " " "	43,500	66,500	●	
l- " " " "	1,760	1,800		●
l-Phase 50% " "	43,500	53,200	●	
l- " " " "	900	909		●
l-Phase 10% " "	43,500	45,000	●	
l- " " " "	183	184		●
l-Phase 5% " "	43,500	44,200	●	
l- " " " "	92	92		●

(Last two items—5% of winding—do not appear in Fig. 1)

28,000-kva. Generator

3-Phase End of Winding	5,800	18,100	●	
Phase- " " " "	4,000	14,800	●	
l- " " " "	6,090	17,200	●	
l-Phase 10% " "	6,090	6,500	●	

Although the "three potential-transformer method" of ground detection is not affected by third harmonic voltages produced in the generator windings, the economics and bus arrangements usually determine the scheme to use.

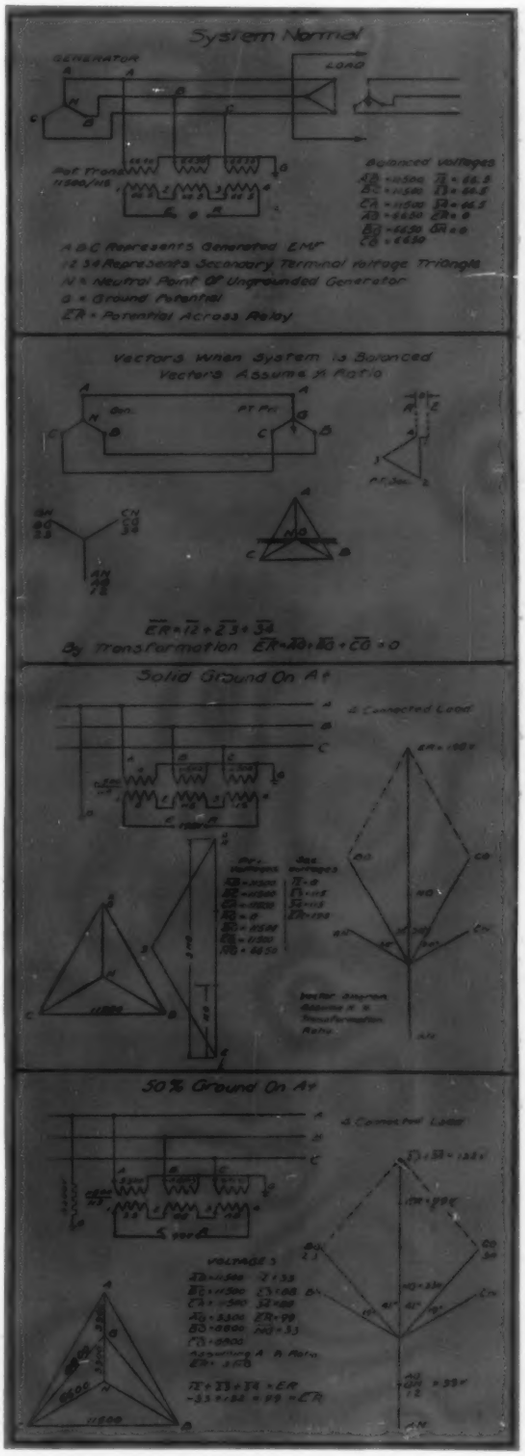


Fig. 2—Three-potential ground detector method

When two generators (neutrals-ungrounded) are connected to system

through a delta-Y bank, the circuits for third harmonic currents are as shown in Fig. 5.

In these circuits Xg is the zero sequence reactance of the generators at normal frequency, Xt is the reactance of a potential transformer and Xc is the total capacitive impedance to ground of all the 50-cycle equipment at the same voltage.

Circuit A is drawn for three potential transformers connected to the bus as a ground detector. The only source of third-harmonic voltage is the saturation characteristics of the potential transformer which is exceedingly small, and the circuit consists of 3Xt in series with 1/3Xc. 3Xt and 1/3Xc are the normal zero-phase-sequence values for third harmonics.

Circuit B is drawn for one potential transformer connected from neutral to ground at each machine. There are two sources of third harmonic, one in each generator, and the circuits for each consist of 9Xt and 3Xg and then in combination through 1/3Xc. These values are the normal zero-phase-sequence values for third harmonics.

If two generators, each with neutral grounded, are parallelled on a common bus, the third-harmonic currents will flow as the load of the generators becomes unequal.

4. What about arcing grounds?

An ungrounded system is apt to be subjected to arcing ground disturbances. These are hazardous to insulation and act in such a way as to cause flashovers at points removed from the location of the initial flashover to ground. It assumes the nature of a high-frequency oscillatory voltage between flash overs. Severe oscillatory voltages may appear on the other two phases.

Briefly stated, these voltages arise because the current passing through the arcing ground is a capacity current and therefore 90 deg. out of phase with the voltages.

When the current approaches zero and the arc goes out, voltage on the lines is close to its maximum. This voltage may be 3½ times normal voltage to ground. This leaves a charge trapped on the system when the arc extinguishes. When the arc restrikes at a peak of the voltage wave, it discharges the condenser formed by the lines and ground.

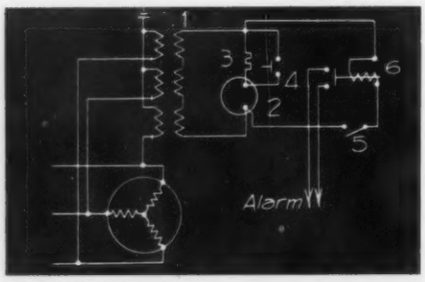


Fig. 3—Method using three potential transformers connected to the three phases. (1) Potential transformers should have ratio of line voltage to 110 volts. (2) Voltmeter ground detector scale marked "percentage ground". Two scales 0-10 and 0-100. Internal resistor so voltmeter reads 0-10 with 0-20 volts. (3) External resistor to give voltmeter 0-100 scale with 0-200 volts. (4) Push button to short out external resistor changing detector from 0-100 scale to 0-10 scale. (5) Knife switch to open alarm relay (to be used to stop alarm). (6) Alarm relay. This is a special low-burden relay by Western Electro Mechanical Co., wound to close contacts on and above 20 volts, 50 cycles

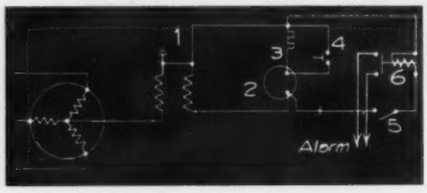


Fig. 4—Method using one potential transformer connected to neutral of generator. Items numbered, same as under Fig. 3, except: (2) . . . Internal resistor so voltmeter reads 0-10 with 0-7 volts. (3) External resistor to give voltmeter 0-100 scale with 0-70 volts. (6) Alarm relay to close contacts on and above 7 volts

Arcing grounds cannot occur unless the system is of great extent and the path from lines to ground of high impedance. This fact eliminates most condenser and generator installations from this kind of disturbance.

5. Should lifting neutrals of rotating equipment affect the normal differential protection?

The answer is "no." Regular differential protection should be left to protect against any fault excepting one phase to ground.

6. What takes place when the ungrounded machine is subjected to the so-called surges?

Each company must make its own decision as to the amount of protection necessary for protecting machines from surges caused by lightning or other phenomena which subject insulation to high voltage, especially stresses due to steep wave fronts and reflected voltages.

Stresses occur on machines whether connected delta or Y and whether neutrals are grounded or ungrounded. It is true that stresses are usually considered more severe when a machine is ungrounded because of reflections in the windings. The grounded-neutral machine is usually considered as one whose grounding impedance is less than 50 ohms.

Excerpts from "Surge Protection for Rotating Machines" as given in the Westinghouse catalogue and other information reveal recent ideas on this subject.

Protecting a rotating machine against a surge involves doing two things:

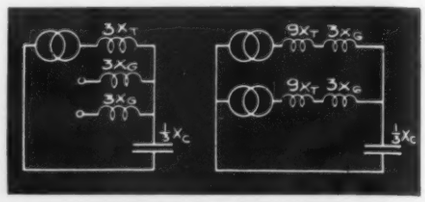


Fig. 5—Circuits for third-harmonic currents when two generators, with neutrals un-grounded, are connected through a delta-Y bank to system

limiting the magnitude of the surge—changing the steepness of the wave front to minimize the stress on the turn insulation and insulation to ground at the machine terminals—and limiting the voltage stresses to ground on the remainder of the insulation.

Magnitude of voltage to ground can be limited by a lightning arrester. The rate of rise of voltage at the terminals can be definitely limited by a capacitor at the machine terminals charged through an impedance.

The armature insulation to ground is stressed by the incoming surge voltage to ground and by reflections in the machine winding. The turn insulation is stresssed by a voltage which depends on the rate of change of voltage of the incoming surge as it penetrates the winding.

Voltage stresses to ground must be limited to the crest of the 50-60-cycle test voltage which is twice the rated voltage plus 1,000. To protect turn insulation, either more insulation must be added or the rate of rise of voltage at the terminals must be limited.

Lightning impulses may be transmitted through transformers by both electrostatic and electromagnetic coupling, even when the high-voltage side of transformers is adequately protected by lightning arresters.

The lightning voltage transmitted by the electrostatic coupling is influenced by the form of transformer construction, the windings on the core, by the capacitance of the low voltage buses and cables and by general characteristics of the rotating machine. The electromagnetic transfer depends on the turn ratio and short-circuit reactance and kva. of the transformer, and on the bank connection.

The energy of a transient is free to travel over the system, but it may become divided or reversed in direction

and polarity at points where the circuit characteristics change. Theory and oscillographic investigation show that if a line terminates in an open circuit, or in a very high-surge impedance such as a transformer, the surge voltage at the terminal is nearly doubled because of reflection. It is therefore possible that the voltage would rise to nearly twice its original value at the line terminal.

When the line terminates in a short circuit to ground, the surge voltage at that point is reduced to zero because an equal voltage of reversed polarity is reflected, neutralizing the incoming wave at the grounded point. This reflected wave, however, proceeds back along the line and when its front has passed the tail of the incoming surge, the line is again subjected to a transient disturbance equal to the original one.

There will be zero voltage at the grounded point, but insulation trouble may develop at some other point. A dead ground does not remove energy from a transient and therefore has no losses. The transient energy must be reflected back into the line with reversed voltage.

If the line terminates in a resistance equal to the surge impedance of the line, there is no reflection because the energy would be absorbed by I^2R losses. This resistance would not reduce the surge, but only absorb it and keep it from reflecting.

An effective arrester should reduce the surge voltage and at the same time absorb a sufficient amount of the transient energy to prevent hazardous reflections.

Conclusion

We find that the methods which have been described in this paper are, in general, used in California.

(1) The solidly-grounded neutral

(2) Neutral grounded through a reactor

(3) Neutral grounded through a potential-measuring device.

A few of the older-type machines are ungrounded because the neutral end of the windings is not brought out. The three-potential-transformer ground-detector scheme could perhaps be connected to machines of this type.

To date, there have been no papers presented which give a comparison of the advantages and disadvantages of the three systems from an operating or maintenance standpoint.

However, from our experience we believe this general statement can be made: "When generators or synchronous condensers are connected to a system through a bank of delta-wye transformers, their neutrals should be ungrounded and potential measuring devices used."

Fig. 1—Schlieren photograph of horizontal cylinder in free space, permitting measurement of light deflection. Diam.=2.31 in.; Temp.=302°F.

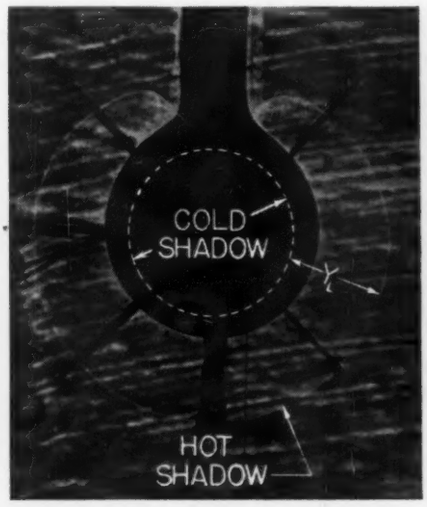
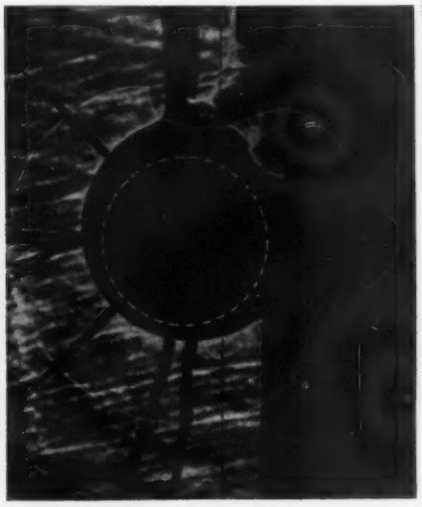


Fig. 2—Schlieren photograph of horizontal cylinder with water-cooled vertical wall 0.07 in. away. Diam. = 2.31 in.; Temperature = 305°F.



Photographing Heat

Schlieren method affords electrical men a simple tool for measuring convected heat; can be applied to problems ranging from space heating to refrigeration

By L. M. K. Boelter

IN MANY electric heating or refrigeration applications, it becomes necessary to distinguish between radiated and convected heat. Good design of a space-heating installation, for example, requires an optimum ratio of heat transfer by these two means. A convenient way of making this distinction is by means of Schlieren photographs.

The method depends on two facts: (1) that air temperature—for a short distance from the surface of a heated solid—decreases almost directly with distance from the surface; (2) that a light ray passing through the heated air will be deflected.

Thus the deflection of a light ray can be used to measure the rate at which heat is being conducted from the surface of a heated solid into the air.

In Fig. 3, a horizontal cylinder is shown at the left. If a light ray (dotted line), initially tangent to the cylinder, be passed from left to right, it will be bent away from the cylinder's surface and will strike the screen at A instead of at B. For a given air temperature and cylinder temperature, the slope of the emerging light ray will be approximately proportional to the temperature gradient. The temperature gradient multiplied by the thermal conductivity of air yields the rate of heat loss by free convection per unit area.

The slope of the light ray may be determined by exposing sensitized paper at the screen. On such a photograph, the distance from the shadow of the cold cylinder to the outermost part of the hot shadow—that is, the deflection of the light beam—can be measured off. This deflection, divided by the distance through which the deflection occurred yields the slope, approximately.

In Fig. 3, the deflection is AB, or Y_L, and the approximate slope is Y_L/L.

Fig. 1, is an actual Schlieren photograph. Without resorting to calculations, it is apparent that heat loss per unit area is almost constant to within an angle of 30 deg. on either side of the

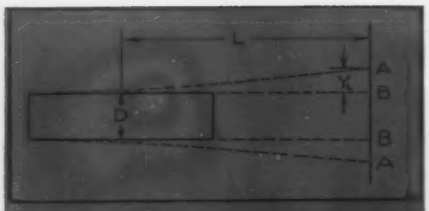


Fig. 3—Deflection of light ray passing a cylinder. When the cylinder is cold, the ray strikes the screen at B; when hot, at A.

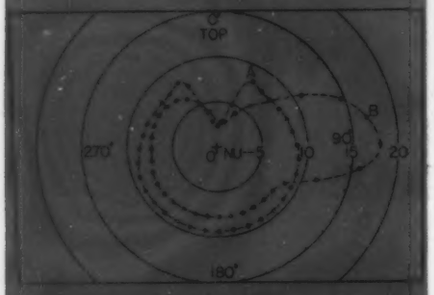


Fig. 4—Distribution of heat loss about a horizontal cylinder. A, in free space. B, 0.03 in. from vertical wall. Diam. = 0.898 in.; Temperature = 157 deg. F.

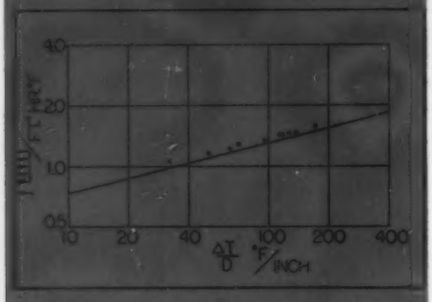


Fig. 5—Correlated data. Delta = difference between cylinder and air temperatures; D = cylinder diam.

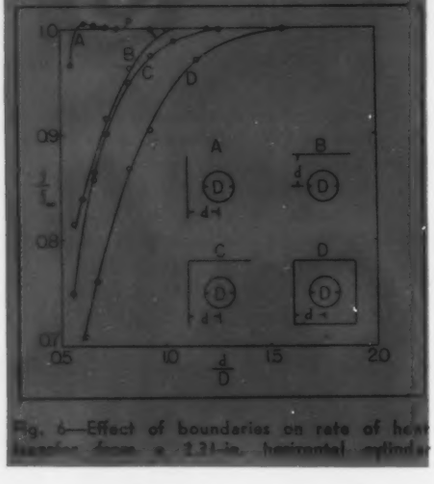


Fig. 6—Effect of boundaries on rate of heat transfer from a 2.31-in. horizontal cylinder

cylinder top. At top, where the air leaves in a stack, the heat transfer rate is only a fraction of that at the bottom.

The rate of heat loss as a function of angle is shown in Fig. 4. As cylinder temperature is changed, the shape of the curve varies. Data for average heat loss may be correlated as in Fig. 5.

In Fig. 1, the cylinder was far from obstructions. In Fig. 2, the same cylinder is placed near a water-cooled wall. Heat transfer is seen to be relatively greater on the wall side. This may arise from increased air velocity or from the wall's being colder than surrounding air.

The effects of some simple surroundings are shown in Fig. 6, where factors on the vertical scale show the ratio of heat loss per unit area to that which would exist were there no obstructions. It is seen that for this particular cylinder (2.31-in. diam.) a vertical wall causes no change in the rate of heat transfer until the cylinder is within ¼ in. However, when the same cylinder is placed in a tunnel, deviations begin when the walls are 2 in. away.

If the quantitative results are not desired, the Schlieren method may be applied to a variety of technological shapes. It will be found useful in the design of many industrial heating installations, and it has the merit of requiring no costly or complicated equipment. Furthermore, it yields data which are extremely difficult to secure by any other means.

Big Transformers Dried In Portable Tank

LARGE power transformers on the Southern California Edison system are being field dried at a saving in man-hours through the use of a vacuum tank which can be dissembled and moved from plant to plant. Superseding the hot-air or impedance process, the vacuum method worked so successfully on seven 18,500-kva. transformers that it probably will be aplied to 47 others.

The Equipment

Equipment for vacuum drying, as developed by Edison, consists mainly of the vacuum tank itself, together with condenser and vacuum pump. The tank is a vertical cylinder, in three sections, made up of welded ⅜-in. steel plate, with I-beams for stiffening and for carrying the weight of the transformer. Inside dimensions are: 10 ft. 6 in.; height, 15 ft.

Use of three sections keeps individual pieces small enough to be moved by truck over mountain roads. Each section carries heavy flanges. These, together with gaskets, permit the assembly to be bolted tight.

In the top section are manholes, one cover having a plate-glass window. Fourteen tapped holes accommodate ordinary automobile spark plugs, used to carry leads for thermal and resistance measurements.

Pipes to the tank provide for: admitting and draining transil oil; pumping the vacuum; operating a mercury manometer and a recording vacuum gage. Sockets accommodate recording, indicating and contact-making thermometers.

With the tank, 1,500-watt, 230-volt strip heaters are mounted around the sides. Outside, 2 in. of insulation, held in place by poultry netting and covered with canvas, minimizes heat loss.

Vacuum is attained by means of an oil-sealed, rotary-type pump, rated 43 cu. ft. per min. at 350 r.p.m., driven by a 3-h.p. motor. A 16-sq. ft., water-cooled condenser between pump and tank serves to condense transil oil evaporated in the tank, while water vapor passing this unit is caught in a second condenser on the discharge side of the pump.

Heating rate is controlled by connecting the strip heaters in various series and parallel combinations. Heaters at the tank sides are controlled by a contact-making thermometer at the top, while a second group at the tank bottom is controlled by a similar thermometer under the transformer.

The Process

First step in drying is to place the complete transformer winding and core assembly within the tank. Then the tank is closed, connections made and instruments read.

Next, full heat (about 62 kw.) is applied for 2 hr. For the next 18 hr., heat input is maintained at about 29 kw. When average temperature of the

high-voltage winding, calculated by the resistance method, has reached 70-75 deg. C., the vacuum pump is started and heat input reduced to about 16 kw., which is sufficient for the remainder of the process.

About 10 hr. are required to attain the 28-in. Hg. vacuum, which is within ½ in. of maximum possible at 1,400 ft. elevation. While vacuum is maintained, which may be for 28 days, temperatures are kept close to 90 deg. C.—above boiling for the low pressure involved.

Drying continues until: (1) water rate is reduced to 1 oz. per hr.; (2) megger readings become constant for a 48-hr. period; (3) resistance of the high-tension winding becomes constant. Reason for the last is that evaporating water keeps copper temperature down. When water is gone, winding temperature approaches 90 deg.

When these conditions have been met, the entire tank, still under vacuum, is filled with clean, dry transil oil and allowed to stand for 12 hr. The assembly is then transferred quickly to its own tank.

Before the transformer is returned to service, it is heated for 12 hr. under a 5-in. vacuum by short-circuiting the low side, applying 11 kv. to the high. This keeps temperature near 60 deg. C., circulates the oil and causes air bubbles to rise.

The Experience

It has been found unnecessary to keep a man on the job continuously. After vacuum and control temperature have been attained, only attention is by the station operator, who checks once an hour, and by the test man, who reads instruments once every two days. This procedure has reduced total man-hours chargeable to the entire process (including placing and removing unit) from 1,000 to 416.

From each of the first seven units dried, 4 to 19 gal. of water were removed. Samples of insulation showed that a 2.5% moisture content was reduced to 0.1% by weight.

Only shortcoming in the equipment described is the spark plugs used as bushings for the megger leads. More leakage distance is required; it was necessary to drop vacuum to take megger readings. Spark plugs proved satisfactory, however, for leads to temperature-indicating coils.

J. C. Gaylord, Edison's hydro engineer, who was closely associated with the development, feels the method gives quicker results than "cycling," wherein vacuum and a hot-air bath are alternately applied.

Results have been good, costs reasonable, and the scheme affords a means of knowing definitely when transformers are dry.

Hydro Maintenance

Detailed experience with troubles which afflict most all the older Western hydro plants. This is another outstanding report of the production-substation group of the Operating Economics Section, PCEA

By C. P. Rhine

Part 1

MOST hydro-electric stations on the Pacific Coast have been in operation from 10 to 25 years. The problems of the maintenance engineers are increasing in proportion to the ages of the plants. It is not only that the machinery is becoming worn out and obsolete, but also that the dams, tunnels, conduits and structures are showing the effect of this long service.

The exceptionally high water of the last few years has made its inroad on the foundations of some of the diversion and storage dams of the overflow type. Large holes have been cut at toes of structures, requiring the placement of large quantities of concrete to retard under-cutting and put foundations in satisfactory condition.

Flume Steel

On account of stumps and vegetation in the bottom of Bass Lake the water appears to contain a high percentage of tannic acid, which corrodes galvanized iron as well as copper-bearing flume steel.

The best method we have found to date for preserving flume steel, is as follows:

(1) Sand blast the surface, removing rust and paint. Pit run sand has proved satisfactory for this work. It is run through the machine two or three times before being discarded. If it is necessary to clean the outside surface, after the second run on the inside, the sand is disposed of by blasting the outside. A maximum of 2,200 sq. ft. of surface has been cleaned in 8 hr.

(2) For the inside surface of the sheet, first apply, by means of a spray gun, a prime coat of Regal roofing paint cut 50% with gasoline. After the prime coat has set a heavy coat of J-M No. 190 asphaltum is hot-mopped to a thickness of 1/16 in. at the top of the sheet and ⅛ in. at the bottom, or that 3 or 4 ft. at the bottom where scouring action from sand prevails. This asphaltum flows freely at a temperature of 350 to 400 deg. F. It also flashes at 409 deg., and therefore, it requires close attention by the kettle man or there will be boil-overs and loss of material. It has been our experience that the mortality rate for thermometers is very high in the field, and therefore, other methods had to be developed to ascertain the temperature. Color of the fumes off the kettle or the way the water will fry on the asphaltum has proved to be a satisfactory method. For preserving the outside surface of the sheets a good coat of aluminum applied by means of the paint gun has given very good results.

Since most of our conduits are built on a hillside, a small flow of water through a crack in the concrete may become a small river with its accompanying washout of the subgrade and bank supporting the downhill lining. This has happened several times on our division. Therefore, it is one of the duties of the ditch walker to inspect the drains, paying particular attention to the color of the water being drained from underneath the floor.

This applies to the concrete lining of the trapezoidal section, which has been a source of worry as well as of high-cost maintenance.

Due to flexing of the walls, the subgrade is packed, producing a breathing action when water is cut. In other words, when the walls are unloaded they assume their original position, thus leaving a void back of the walls. This action breaks the bond between the walls and the floor, thereby producing cracks in the concrete. Piers have been installed in the worst places to hold the walls rigid. The construction joint between the walls and floor has been reinforced by cutting away the concrete for 2 in. on either side of the crack and pouring a small concrete beam with a wedge-shaped section. This has given fair service in some places. In other parts of the conduit, floor and beams dropped from the walls, making it necessary to replace the floor. Cracks are sealed with Biturine Plastic Cement also Tnemec Waterproofer, and both

have given good service. The disadvantage of either waterproofer is that the concrete must be dry in order for the material to make a good bond.

Turbine Runners

Maintenance of bronze turbine runners may be exemplified by giving a history of the procedure and experiments carried on at Kerckhoff power house over a period of 18 years.

Pitting of the runners has dated back to practically the second year of operation, 1921. Between 1921 and 1932 a plain No. 10 gage, (Stubbs Gage, 0.134 in.) black-iron patch was used, studded in with 5/16-in. threaded studs, riveted over on countersunk holes. These patches covered an area of approximately 20 sq. in. at the start, and as pitting became more prevalent increased to 55 sq. in., which was the limit of the size a patch could be. These patches pitted and had to be renewed at least every second year and at the same time decreased the efficiency of the runner.

During the winter of 1932, a test was made on No. 1 runner using seven different types of metals as follows: copper, half hard; brass, half hard; Monel metal; duralumin (U.S.A. Spec. No. 57-152); steel, cold rolled; steel, stainless, annealed and hot-rolled, and Aluminum, half-hard drawn. The plain cold-rolled patches have a heavy coat of porcelain. All these patches were to be attached to the runner with ¼-in. oval-head machine screws.

After a run of eight months, inspection revealed these pitted metals: copper, aluminum, duralumin, cold-rolled. The porcelain on the cold-rolled chipped off, and the unprotected metal pitted as in the past.

The unpitted metals: monel, stainless steel and brass. Although the brass did show an indication that it was not unpitted, it was not considered sufficient to place it under pitted metals. This experiment proved the efficient metals but we were still under the handicap of a lowered efficiency which was a condition not tolerable under good operation, and therefore, more research was necessary.

Cementing Runners

In 1936 it was decided to try out a special type of cement, called Chrome-Nickel Hydraulic-Turbine Cavitation-Resisting Cement. It had been used in the east upon runners, operating under low heads, very successfully.

In the meantime, metallizing by torch method, of surfaces, was taken under consideration and an experiment on No. 2 runner was finally decided upon. As is the case in most experiments, we started out under several handicaps, and by the time the runner was metallized, using a stainless-steel metal wire, No. 11 B & S gage, we had located practically all of our mistakes and also discovered that it would be necessary to remove the runner to obtain a satisfactory job. This being a rather laborious and expensive procedure, we fell back on the aforementioned non-cavitating cement and decided to make and experiment with it on No. 1 runner. Refering back to the metallizing job on No. 2 runner, we found two conditions of procedure that must be conformed to, or else the metallizing will be of no value whatsoever. First, complete absence of all moisture; second, a sanding machine to clean and abrase perfectly the surface to be metallized. It is practically impossible to conform to the moisture handicap without removing the runner.

During the spring of 1937 the cement was applied to No. 1 runner. The efficiency of this runner improved immediately but for only a short time, as the cement failed to adhere to the runner blades. We had the same results on No. 2 runner in regard to the metallizing, its adhesiveness to the runner being of very short duration.

All this time and labor was not lost however, as there last two experiments proved that by replacing the metal lost through pitting we could regain our efficiency and at the same time save the expense of dismantling the machine to remove the runner, either for repairs or a new unit.

After continued research in respect to different types of metals, it was decided that we try Sil-Fos on No. 2 runner. This was in February 1938. Sil-Fos is a metal made up of copper, silver and phosphorous. It has a tensile strength of 95,000 lb., a Brinnell Test of 185 and a melting point at 1,300 deg. F. This metal is plated on the surface of the runner blades with acetylene torches and will adhere to the following different metals: brass, bronze, nickel-silver, and Monel.

After applying the Sil-Fos, surfaces were ground and polished to mirror finish. This type of application brought the runner blades to their original contours and thereby returned the lost efficiency the previous patches had absorbed.

This work was carried on during high tail-water period, and we had to rush this experimental job so as to clear before the water reached a level that would prevent entering the draft tube. Sil-Fos applied to the runner has a wavy form, and it was apparent, after completing this runner, that more metal should be applied so that the grinding operation would not remove too much initial metal before obtaining smooth surface. Results of this experiment were very encouraging. It was decided to apply Sil-Fos metal to all three runners in 1939.

Experience this Year

In January 1939, No. 1 runner was Sil-Fosed, then ground and polished. Considerably more metal was applied to this runner, and the results of grinding were very good. One discouraging feature was numerous small pin holes along the surface after grinding. This condition apparently resulted from moisture back in the cavitated areas which steamed under the application of heat and created minute bubbles which did not appear until the grinding removed the outside surface.

After applying Sil-Fos metal to No. 2 runner, the initial surface was considered of sufficient smoothness to allow it to go through without grinding, as an experiment to determine the difference in wearing qualities of the outer skin surface and the inside polished surface. At the same time, the small pin holes were covered and therefore not exposed to the initial cavitation forces.

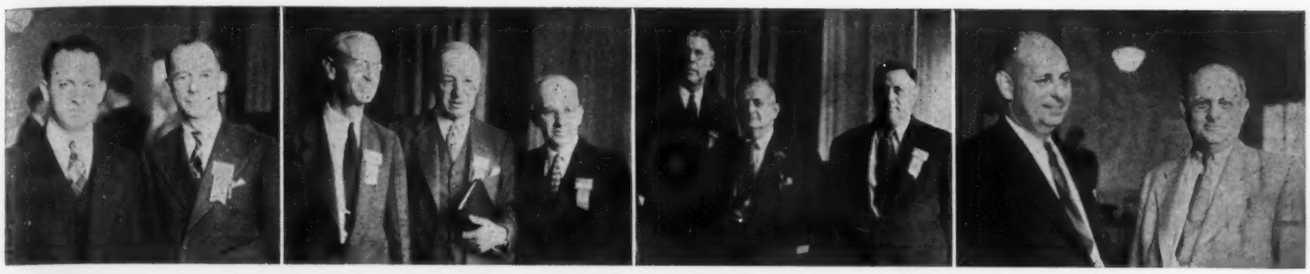
After No. 2 runner was completed, No. 3 runner was Sil-Fosed. It was during this period we discovered the method of obliterating the small pin holes. We had previously tried peening without success, so this time we used a very small, high-speed pneumatic air-hammer and, upon completing a small section, peened it thoroughly, and continued throughout the runner in the same manner. This peening not only closed up all the small pin holes but. also left a smoother outside surface and intensified the toughness of the outer skin considerably.

Because the surface was fairly good after peening, it was decided to dispense with the grinding and polishing and leave this runner as an experiment also. We now have three types of finish; polished, rough, and semi-rough, and at the completion of this year's run, will have a chance to determine which method will be most satisfactory.

This work of Sil-Fosing the runner has raised the efficiency of the plant considerably, especially on No. 1 runner, which was in poor operating condition. This unit alone, during the past two months under full-load, has developed and held an increase of 1½% in efficiency. This increase does not hold good for the other two units. Increases on these will be approximately ½% each.

There are so many factors to consider that it is difficult to work out a satisfactory formula especially because of daily changes in water conditions which in turn affect the overall efficiency of the plant. Therefore, to obtain the above percentages mentioned, a comparison has been made under as nearly comparable conditions as our records will give.

(Continued next month)



GERBER TRETHEWAY LLOYD TOUSLEY GOING DIXON GREY STURGES KIRSOP WEBER

Inspectors Vote Down Bare Neutral

INSPECTORS are the first hurdle in the introduction of new wiring methods. For that reason the joint meeting of the Northwestern and Southwestern Section of International Association of Electrical Inspectors in San Francisco Aug. 14-17 was considered particularly significant. Whatever it did in respect to the Edison Electric Institute proposals for revision of the National Electrical Code might well be taken as an index of inspector thinking throughout the country. Particularly was this so because this joint meeting was the first to be held this year by the IAEI.

While the convention did not recognize the EEI proposals separately and while procedure was held strictly to discussion of the preprinted recommendations of the Article Committees, the major changes under consideration were those resulting from the EEI proposals.

Dr. Morton E. Lloyd, president of IAEI, and chief, section of safety codes, National Bureau of Standards, Washington, D. C.; A. R. Small, president Underwriter's Laboratories Inc., Chicago; and E. A. Brand of Buffalo, Niagara and Eastern Power Corp., chairman of the EEI wiring committee, each expressed viewpoints on the code changes which had a material effect on the decisions finally voted.

Briefly, the thin wall, new compound insulations for building wire were approved for use in the rewiring of old installations; use of more space in existing conduit was approved with reservations, the new concentric building wire as recommended by the Article Committee on a basis similar to that of non-metallic sheathed cable; and bare neutral were both turned down flat.

The convention started Monday morning when Ben Hill, superintendent electrical department, Oakland, as Northern California Chapter chairman turned the gavel over to C. M. Kirsop, Olympia, Washington, president Northwestern Section. He and W. J. Tretheway, Huntington Park, California, president of the Southwestern Section, presided in turn over the sessions of the convention. J. B. Black, president, Pacific Gas and Electric Co., welcomed the convention.

After paying tribute to the late Carl Hardy, Dr. Lloyd in his presidential address reviewed the new procedure for the revision of the Code and cautioned the inspectors to judge proposals for revising the Code on a basis of known facts and experience. "One should not compromise with safety; therefore commercial considerations must take a secondary place," he said. "A Code is not like a purchase specification or a contract, wherein a certain amount of bargaining may be involved. Bargaining and compromise are out of place in Code making. Commercial interests should be heard, but should not make the decisions. The public interest is paramount."

From the experience record of electrical fires and accidents he contended that greater exertion was needed to eliminate such hazards.

Of bare neutral, Dr. Lloyd was more critical. Just what effect stray currents from a bare neutral installation would have on water piping, the quality of water, and on gas pipe systems, he left open to question. Finally, he maintained, that bare copper conductor inside a run of conduit is entirely superfluous and a waste of both copper and of space. "Since the bare conductor will be in contact at many points with the conduit, the conduit would be carrying part of the current anyhow and is fully capable of carrying all of it," he said. "As I see it, the question consequently resolves itself into one of whether the conduit system itself should be used as a conductor, and the subject should be discussed upon this basis." As to concentric wire with covered neutral, he questioned the claim of economy which he said was its chief recommendation.

C. M. Kirsop in his address asked that Code changes be based on facts and engineering. He said that in his experience high cost materials usually went with low installation costs and that low cost materials usually went with high installation costs.

W. J. Tretheway suggested that the Code be made in loose-leaf form so that expensive revisions could be eliminated and current revisions of rules be facilitated. He maintained that by the time Code changes are made now and printed and distributed, many are outmoded by the fast developments of the industry.

Secretary-Treasurers of the two inspectors' associations, F. D. Weber, Northwestern, and H. L. Gerber, Southwestern, reported growth in membership and a stronger financial position.

Reports were also heard from the Puget Sound Chapter, from W. L. Gaffney, Tacoma; Utah Chapter by J. Hyde Staynor, Salt Lake City; Central California Chapter, J. R. Lazarus, Fresno; Greater Central Valleys Chapter by Clifford Prud'homme, Sacramento; Northern California Chapter by H. L. Gerber, San Francisco; and Southern California Chapter by F. A. Short, Los Angeles.

E. A. Brand addressed a joint meeting of the convention and the San Francisco Electrical Development League at noon Monday. He enunciated the EEI objectives from its published statement to the inspectors. Some fear had been expressed, he said, that the proposals might lead to unsafe wiring yet operating utilities must be sure that these materials are safe for they will have to live with the installations years after they are made. Utilities, he reminded, were spending money in the promotion of adequate wiring for existing materials, but felt that research and product development as shown at the World's Fairs should bring to wiring materials improvements that the industry could use. Utilities, he declared, had made extensive improvements and lowered their rates by taking advantage of product development for their systems.

The object of the proposals, he said, were to increase wiring in new resi-

dences and to do something about the 95% of industrial and commercial buildings which are not keeping pace electrically with modern times. The new materials, he repeated, were a result of invention and had been thoroughly tested in field installations. Checked by the utilities and by Underwriters Laboratories, he said, they had demonstrated their safety. He concluded by pointing out the benefits the industry would enjoy in increased wiring, more work, and a wider use of appliances.

A. R. Small, in a surprising and forceful address, probably influenced the final decisions taken in the vote on each of the proposed changes to the Code. As president of Underwriter's Laboratories as well as chairman of the Electrical Committee NFPA, he spoke of the purpose of the Electrical Committee in reverse English. By telling "what the Electrical Committee was *not*," he clarified just what the committee purpose was.

Reviewing how adequacy provisions had gradually been incorporated into the safety codes because adequacy in itself was an assurance of safety, he spoke of the difficulties some inspectors had experienced with Section 2110 of the 1937 Code, which some had felt was beyond the police power of the inspectors to enforce. "It is not the province of the Code to provide for a worthy objective unless we can secure a safeguard against hazards at the same time," he emphasized.

"Another thing, it is not the province of the Code to build new business for central stations, nor to provide additional labor for electrical workers, nor jobs for contractors. There are several other proper channels for such promotion. It is not the province of the Code to choose between methods of wiring nor to refuse recognition of new methods, nor is it the purpose to deny to the promoters and inventors of new methods and products the right to sell them as long as they do not detract from the safety of the public."

Wondering what his position would be relative to new materials and new insulations he said he felt a responsibility of going along with the promotion of research and new ideas. "Maybe we ought to find out whether placing nine or eleven of such new wires in a conduit and loading them to 22 amp. would boil all of the water out of the conduit. Maybe we ought to find out and not hold the industry back," he said. He suggested inspectors try the limited use of such materials in remodeling old work, frankly telling the lawyers that they were trying to see how these new materials would stand up.

The remainder of the business session was devoted to consideration, article by article, of the proposed changes to the National Electric Code as submitted by the Article Committees of the Electrical Committee and published in Part 2 of the IAEI News-Bulletin July, 1939.

Very few changes to the Article Committee reports were voted, most of them being of minor character. Hurrying through the procedure the first day, some of the important controversial points were felt to have been neglected and were brought up again for further discussion on Wednesday. It was then that the EEI proposals were fought over and finally after parlimentary snarls, clarified and voted upon. Minority reports in several instances precipitated

Inspectors inspecting the Fair—Prud'homme, Tretheway, Shaffer, and wives at the Westinghouse exhibit

the discussion. When the smoke cleared, the Article Committee recommendations as to thin insulation, and space factor in conduits, were approved, while concentric wiring and bare neutral were turned down flat.

Code breakfasts were held on Tuesday, Wednesday, and Thursday mornings with John Casey, Walla Walla, Wash.; H. S. Jenkins, Bellingham, Wash.; and George Price, Orange County, Calif. as discussion leaders respectively. The first Code breakfast permitted an airing of an almost universal dissatisfaction with the performance of the fittings for electric metallic tubing. That these fittings work loose under ordinary vibration was reported by a number of inspectors. Later the proposals to enlarge the scope of use of electric metallic tubing were voted down decisively as a reaction to this expressed dissatisfaction with fittings.

The second breakfast provided a spirited discussion of emergency lighting for theaters and places of public assembly. Most of the inspectors felt that the present Code requirements are not definite enough nor are they mandatory. Emergency systems employing a tap ahead of the service switch were declared to be virtually of no value because power failures in small towns usually occur on the high lines and leave the theaters without emergency lighting service. Maintenance of battery systems was declared to be a serious problem also. The Electrical Committee was asked by motion to make more definite rules pertaining to emergency lighting.

The third breakfast was devoted to an interchange of experience in the administration of an inspection department. One novelty reported by Harry Dobson, Santa Barbara, California, was his use of a camera to take pictures of installations of which he found fault, and of failures and accidents. The psychological effect of his picture taking on the wiremen was that of promoting more careful workmanship.

J. W. Whittington presented the new public relations committee movie, "Preventing Fire through Electrical Safety," made in cooperation with fire chiefs, and designed to be used in public meetings to educate for safety. At an earlier session, Mr. Whittington, who had escaped injury on the Streamliner wreck enroute to the convention, was asked to describe his experiences to the convention.

Business meetings of the two associations were combined also on Thursday morning to hurry the convention to a close. Highlight of this meeting was a public relations committee report made by Captain Stephen Stanislo, colorful fire captain from Seattle. He stressed the necessity of selling the inspectors' association to the public by means of

SANISLO (and harmonica) TRETHEWAY SMALL BRAND

radio addresses, luncheon talks, window displays. He urged support of the Adequate Wiring movement by constructive recommendations to the public.

Officers elected for the Northwestern Section were: president, Blaine Grey, chief electrical inspector, Salt Lake City; first vice president, I. B. Sturges, deputy electrical inspector, Portland; second vice president, W. L. Gaffney, chief electrical inspector, Tacoma; secretary-treasurer, F. D. Weber, electrical engineer, Oregon Insurance Rating Bureau, Portland; executive committee: D. J. Heatherington, electrical inspector, Boise; T. E. Underwood, deputy electrical inspector, State of Washington, Spokane; C. M. Kirsop, chief inspector, Olympia; E. L. Knight, electrical contractor, Portland, class A member; W. L. Flood, Puget Sound Power & Light Co., Seattle, class B member; V. B. Wilfley, Westinghouse Electric & Mfg. Co., Portland, class C member; and S. B. Clark, Northwestern Electric Co., Portland, class D member; Executive Council AIEI, H. A. Patton, Washington Surveying and Rating Bureau, Seattle; Electrical Committee representative, L. W. Going, chief electrical inspector of Portland and F. D. Weber.

Officers of the Southwestern Section elected were: President, James I. Dixon, superintendent, electrical department, Santa Clara; first vice president, O. W. Newcomb, chief inspector, Long Beach; second vice president, Clifford Prud'homme, city electrical inspector, Sacramento; secretary-treasurer, H. L. Gerber, chief inspector, San Francisco; executive committee: W. J. Tretheway, city electrical inspector, Huntington Park; C. T. Coyle, electrical inspector, Fresno; E. M. McLaughlin, city electrical inspector, Richmond; Carl Heise, Westinghouse Electric & Mfg. Co., San Francisco; Representatives on the Executive Council, B. C. Hill, superintendent electrical division, Oakland; R. H. Manahan, chief, department of electricity, Los Angeles; G. E. Price, Orange county electrical inspector; R. W. Wiley, chief, department of electricity, San Francisco; G. E. Kimball, electrical engineer, Industrial Accident Commission, San Francisco; representatives on Electrical Committee: member—R. H. Manahan, alternate B. C. Hill. The Southwestern Section selected Santa Barbara as the city for its next convention. Great Falls, Mont., made a strong plea for the Northwestern Section next year and the matter is to be decided by the Executive Committee. Attendance at the convention totaled 300.

Wiring Is Accelerating

First Regional Conference in San Francisco Finds Successful Wiring Campaigns Gathering Momentum

THAT the adequate wiring campaign is ready to roll on with the same momentum as the successful industry programs on refrigeration, Better Light-Better Sight and the modern electric kitchen was the consensus of participants in the Western regional adequate wiring promotional conference in San Francisco August 17-18. First of a series sponsored by the national Adequate Wiring Bureau, the conference drew an attendance of 110 representatives of all industry branches from eight Western states and Canada.

Especially valuable was the interchange of field experience in wiring promotion, which included everything from complete application of the national AWB certification program in southern California and Red Seal plan in other sections, to isolated promotions by individual contractors. Factual testimony cleared all doubt as to the ability of the industry to sell adequate wiring cooperatively and successfully to new residences. Disagreement arose over selling adequacy in re-wiring old occupancies, although several speakers admitted the new materials and techniques of the code changes proposed by EEI would assist in opening this market.

Keynote for the meeting was set by its chairman, Ralph Wiley, chief of San Francisco's department of electricity, who said that "selling adequacy involves convincing the consumer of the necessity for sufficient outlets and copper capacity to permit any desired use of lighting or appliances with assurance of convenience, safety and proper voltage." The problem, he declared, was a sales one which should be stripped of technicalities and dressed with all of the customer appeal and glamor which the industry was capable of producing. Discussions attacked the problem on seven different fronts, summaries of which follow:

Promoting Adequate Wiring in New Home Construction (led by J. S. C. Ross, P. G. & E. San Jose division sales manager)—Sales approach involves resolving AW into benefits accruing to the speculative builder, owner-builder, financing agency, architect and building material dealer. Speculative builders, who construct 50 to 74 per cent of new homes in metropolitan areas, seek eye appeal rather than convenience or quality. They will include adequate wiring when convinced that it is a selling tool the value of which is commensurate with the additional cost. Range wiring, illuminated house number, bathroom heaters, and an AWB or Red Seal wiring certificate are such sales tools. The owner-builder is easiest to sell provided he is reached before plans and specifications are completed and financing arranged for. Some leagues and utilities secure names through building permits, employee tips and real estate transfers. FHA and other financing agencies can be sold through proof that adequate wiring is a form of insurance against obsolescence. Architects and building material dealers who supply plans can be approached through an offer of service which will insure electrical convenience for their customers.

Discussion brought out that in Salt Lake City a financing agency which offers terms of 20 to 25 years demands AW certification. In Los Angeles a speculative builder conducts nightly radio broadcasts from homes under construction inviting prospective builders to visit homes during construction to see the "hidden values" he includes, such as adequate wiring. G. W. Stephens (P. G. & E.) told how an Oakland tract of 315 five- and 6-room houses priced at $4,750 to $5,700 had been sold Red Seal certification as one of 47 sales appeals such as copper water piping, plank floors, tiled bathrooms and modern kitchens offered by the builder. Elias Strong (Utah Electrical League) described letters written to names secured from real estate transfers offering to check plans and make electrical layouts to insure that the new home is not obsolete electrically before it is completed.

Promoting Adequate Wiring in Existing Homes (led by R. Hall, manager, B. C. Electrical Service League, Vancouver)—Selling adequate re-wiring up to modern standards demands techniques not yet evident. Only where a home is completely remodeled is this possible. A survey of a block of 100 homes showed that a virtually complete new wiring installation would be necessary at costs 75 to 100 per cent higher than new construction. Tests are now under way in Vancouver with a $50 packaged re-wiring installation which includes a complete new service and six duplex convenience outlets installed on one floor of a residence. This is being advertised in newspapers, by direct mail and through some personal salesmanship. Experience indicates that individual salesmen working on a canvassing basis cannot effectively sell residential re-wiring.

In the discussions W. A. Cyr (ELECTRICAL WEST) outlined a plan proposed by an anonymous electrical

contractor which involved the formation of a syndicate of six or eight selected electrical contractors which would install re-wiring on a mass production basis, using specialized techniques and man power. Utility cooperation would be solicited in selling. Provision would be made to reduce inspection costs through posting a bond. "Package" methods would be employed where possible. R. B. McElroy (Wash. Water Power, Spokane) recited experiences with visual demonstrations including a "Half-and-Half" remodeled house (El. West, Nov. 1938, p. 29) and a demonstration board to show the effect of voltage drop on lamp and appliance efficiency. Considerable customer interest in re-wiring has been aroused in this way. Several individuals commented on the possibility of using the new code approved wiring materials as a means of reducing costs. George Barker (manager, PCEB, San Francisco) told of educational work being done with journeymen electricians. A. W. Schanuel (national AWB fieldman) told how utility service men on a Texas property had been trained to talk re-wiring when making service calls. If the customer indicated interest, the name was turned over to a supervisor and a salesman was sent out. This supervisor and four salesmen sold more than 900 re-wiring jobs aggregating $45,000 in one year. The power company benefitted through the additional appliance and lighting load added. Several inspectors present indicated that their group was sympathetic with any program that would promote adequacy in old occupancies because it would eliminate much hazardous and unsafe "lampcord" wiring.

Promoting Adequate Wiring Through Industry Cooperation (led by Stanley Scarfe, General Electric Co., San Francisco) — Experience has proved that industry cooperation through local leagues, tied in with national promotion, is most effective in reaching the public. Facts and figures were cited to show that every branch of the industry, including the appliance group, has a self-interest in adequate wiring. The need for united industry sales effort is being intensified by the campaigns of the gas, paint, glass and other industries for the customer's building dollar. There are places within the industry such as among the so-called "curbstone" contractors where educational effort is required.

F. L. Hockensmith (Electrical Development League of So. Calif.) described meetings which had been held with the appliance trade in the Los Angeles area to interest that group in adequate wiring. How 65 per cent of the curbstone contractors in Vancouver, B. C., had been brought into the electric league with a consequent rise in the standards of competitive bidding was explained by R. Hall. When discussions became heated over the attitude of the contractor toward the AW program, R. D. Horning (Seattle Electrical Contractors' Assn.) told how his group was cooperating although it did less than 10 per cent of the residential wiring work. He made a plea for a plan which would provide some business for the legitimate contractor. Kenneth Hampton (Valley Electrical Supply Co., Fresno) stated that because the contractor is too busy making a haphazard and relatively inadequate living, stimulus and leadership should come from other branches of the industry, and particularly from the utilities. He stated that creation of customer dissatisfaction with existing wiring is the key to solving the re-wiring problem.

That the wiring story can be made appealing if technicalities are forgotten was the declaration of R. E. McDonough (Montana Power) who cited results achieved by taking the wiring story to the public with sales-minded man power. E. H. Wilmunder, Sacramento contractor, told how he was selling re-wiring to landlords by showing them electrical installations in new homes and pointing out the competition they faced in renting their old houses. How wiring standards had been improved in Idaho by means of a series of schools for contractors and wiremen was explained by Carl Baldridge (Idaho Power). That the electrical contractor is not always at fault was emphasized by W. H. Welch, Sacramento contractor, who pointed out that in most residential work a general contractor sets both the price and specifications.

Promoting Adequate Wiring Through Utility Promotion and Service (led by E. G. Stahl, commercial manager, San Joaquin Power Division, P. G. & E.) —Use of unarmed salesmen is a costly and uneconomic means for selling wiring. San Joaquin has a three-part program aimed at different markets. It has an engineer to make layouts and write specifications for large commercial and industrial buildings. For small commercial lighting and re-wiring installations the commercial lighting salesmen have been schooled in wiring technique. They receive help from an engineering draftsman who makes layouts. Because the utility sells no equipment, they have the cooperation of fixture dealers and contractors. In the residential field a trained sales

Victor Tousley, secretary of IAEI, assures wiring conference of inspector support

force is used, which is backed up by advertising and publicity. A wiring job is broken down into five parts and weight given to each part such as 100-amp. main service, range and water heater circuit, and other factors in accordance with Red Seal specifications. A complete job carries a total of 30 points so as to permit salesmen to measure performance and work to quotas. With appliances added, the home has a measure of 100 points and experience has shown that each point represents $1.50 in e.a.r. to the utility. On wiring alone the average home has been raised from 4½ to 10½ points since the sales work started.

C. V. Dunn (Kansas City P. & L.) presented a rating system devised for measuring wiring adequacy irrespective of the size or class of dwelling. H. H. Douglas (So. Cal. Ed.) cited figures to show the utility's interest in certified adequately wired homes. Edison salesmen sold 883 certified Red Seal homes in the first half of 1939, 85 per cent of which had electric ranges installed and 42 per cent electric water heaters.

Promoting Adequate Wiring Through General Promotion and Service Contacts (led by B. W. Reynolds, promotional director No. Calif. Electric Appliance Society)—Work must be done with the inspectors to bring local ordinances more in line with the National Electrical Code. Every avenue of publicity should be used in telling the story to the public. All merchandising advertisements should carry something about adequate wiring. Sufficient publicity will give the AW campaign the same momentum that put over Better Light-Better Sight and electric refrigeration.

Promoting Adequate Wiring Through the Certification Plan (led by J. R. Lazarus, San Francisco regional manager, PCEA)—Mechanics of the Red Seal plan as applied in certain parts

of California were described. Over 15,000 homes have been certified. Specifications must be changed to keep pace with new standards. Long time benefits to the whole industry were shown by experience in British Columbia where Red Seal promotion has been conducted since 1924. In that year the average new home contained 15 lighting outlets, 6 convenience outlets, 10 switches and six miscellaneous appliances with a total aggregate value to the industry of $250 for wiring and appliances. In 1937 the average new home contained 31 lighting outlets, 16 convenience outlets, 19 switches and 10 electrical appliances representing $993 to the industry.

Promoting Adequate Wiring Through Use of National AWB Promotion and Service (led by F. L. Hockensmith, manager, So. Calif. Electrical Development League)—Methods employed in southern California include the following: A mat service on adequate wiring to 64 community newspapers. A question and answer column on the Sunday building pages of metropolitan newspapers. Wiring stories in a magazine that goes to all prospective home builders. Exhibits in the annual Home Show including a "Matchless Electric Home" (El. West, July 1939, p. 29). Mailing of 15,000 folders. Cooperation from 28 utility salesmen selling adequate wiring. A speaker's bureau which puts on programs before service clubs. A total of 120 electrical industry meetings before 5,500 electrical people. A series of monthly electrical contractor "gatherings" attended by an average of 22 of the 30 contractors who install 80 per cent of the residential outlets in the territory. Annual meetings with architects in cooperation with the Producers' Council. Similar meetings with the Building Contractors' Assn. with a membership of 1,800. These activities have placed the league in the position of certifying more homes than any other cooperative organization in the U. S.

Before adjournment the conference passed three resolutions. The first requested NEMA to consider placing a replica of a duplex outlet in the package with every small appliance sold, the replica to explain something about adequate wiring and suggest that the customer secure information from a contractor or the utility. Another resolution endorsed the code adoption of thin-wall insulation and the proposal to permit new space factors in conduit as an aid to re-wiring. A third proposed the appointment of national industry committees to (1) specifically define adequacy as applied to wiring and (2) to study the desirability of changing the code table on the carrying capacities of wires.

Jack Ross, San Jose, shows how certification is merchandised for speculative homes

PCEA Conclaves

Committees and meetings for the year outlined

Fall conclaves of the Pacific Coast Electrical Assn. will be held at the Civic Auditorium, Long Beach, Oct. 12-13, and at Hotel Fairmont, San Francisco, Oct. 19-20, according to President W. W. Glosser. Guidance committees of the three sections are working on conclave programs now. These will be announced in the next issue of *Electrical West.*

President Glosser has named the following as members of the guidance committees:

Administrative Services Section: M. W. Phillips, Southern California Edison Co., chairman; E. A. Long, Pacific Gas and Electric Co., vice-chairman; Charles Braun, Hubbard & Co.; L. W. Coughlan, Pacific Gas and Electric Co.; Charles Davies, San Diego Consolidated Gas & Electric Co.; G. C. Delvaille, Nevada California Electric Co.; P. H. Ducker, Southern California Edison Co.; Charles Grunsky, Coast Counties Gas & Electric Co.; Fred Hansen, Pacific Gas and Electric Co.; C. E. Hewes, Southern California Edison Co., and Stanley Scarfe, General Electric Co.

Business Development Section: Fred C. Todt, General Electric Supply Corp., chairman; E. G. Stahl, San Joaquin Power Division, PG&E vice-chairman; W. E. Cranston, Thermador Electric Mfg. Co.; J. O. Dillingham, General Electric Co.; O. R. Doerr, Pacific Gas and Electric Co.; L. A. Hobbs, Smoot-Holman Co.; W. P. L'Hommedieu, Westinghouse Electric & Mfg. Co.; P. P. Pine, San Diego Consolidated Gas & Electric Co.; G. M. Rankin, Southern California Edison Co.; H. C. Rice, Southern California Edison Co., and C. A. Rowley, Thermador Electric Mfg. Co.

Operating Economics Section: Allen G. Jones, General Electric Co., chairman; H. A. Lott, Southern California Edison Co., vice-chairman; A. Frank Ayres, Nevada-California Electric Corp.; A. M. Bohnert, Ohio Brass Co.; G. E. Bishop, Coast Counties Gas & Electric Co.; R. A. Hopkins, Westinghouse Electric & Mfg. Co.; S. J. Lisberger, Pacific Gas and Electric Co.; L. J. Moore, San Joaquin Power Division, PG&E; H. A. Noble, San Diego Consolidated Gas & Electric Co.; E. K. Sadler, Kelman Electric Mfg. Co., and E. F. Sixtus, Pacific Electric Mfg. Co.

Encouraged by last year's results when 2,100 persons of the electrical industry attended nine district meetings, the PCEA Industry Information Committee has scheduled 12 similar meetings for October and November of this year. The schedule follows:

Santa Barbara	October 30
Santa Ana	October 31
San Bernardino	November 1
El Centro	November 2
San Diego	November 3
Chico	November 6
Stockton	November 7
Sonoma	November 8
San Jose	November 9
Watsonville	November 10
Fresno	November 13
Reno	November 14

The corps of speakers who will take the industry's story out to the rank and file includes G. W. "Doc" Allison, of the Modern Kitchen Bureau, New York; Graham Holabird, National Electrical Products Co., Los Angeles; George C. Tenney, ELECTRICAL WEST Editor; Dr. Paul Cadman, San Francisco and Dr. F. P. Woellner, University of California at Los Angeles.

Industry Day

Speakers for the electrical industry rally at California Hall, Golden Gate International Exposition on Electrical Industry Day, Sept. 16, have been announced by R. E. Fisher, program committee chairman. Representing the Pacific Coast Electrical Bureau, northern division, will be O. R. Doerr, general sales manager, Pacific Gas and Electric Co. J. Scott Milne, vice-president, International Brotherhood of Electrical Workers, will represent electrical workers, and another prominent speaker is yet to be announced.

For the kids program in the morning, television will be the feature. Don K. Lippincott, associate of Philo Farnsworth, television inventor of Provo Utah, and San Francisco, will present the program. Admission of youngsters will be by presentation of a burnt out lamp bulb. Lamp bulb badges are now in circulation for adults.

CONTRACTORS of California hold a convention Sept. 22-23, at Asilomar, near Monterey. Program is now in the making as announced last issue.

IES

Talks Fluorescent, New Photometers, Highway Lighting, New Headlamps, and School Lighting

IN the grand opera of Wagner a *lied motif* or theme, follows each character throughout the entire story. Such themes interweave, recurring again and again in a composite pattern of sound. A convention such as that of the Illuminating Engineering Society, held in San Francisco, Aug. 21-25, (the first ever held in the far West), is a symphonic arrangement of engineering knowledge and its attendant applications in commerce, industry, and domestic life. It has its light motifs, to use a pun, no less significant, and recurring too throughout the convention.

Perhaps in limited space it will be well to follow these threads individually as they weave in and out of the program. After all, more of the value of the convention is to be gained that way.

Most dominant motive was that of fluorescent lighting and its companion, mercury vapor. Utility concern was manifest on three scores: It is being misapplied in the present enthusiasm, selling claims going wild; it is being promoted erroneously as a current-cuting device instead of on its merits; and power-factor and stroboscopic difficulties render it undesirable to utility and user. Answers to these plaints were made by representatives of both lamp manufacturers, either in formal papers or in answer to discussions. Presenting papers were C. S. Woodside and J. T. Bailey of Westinghouse Lamp Co. and A. B. Oday and R. F. Cissell, of GE, Nela Park, who described the field of application for fluorescent lamps; and John W. Marden and George Meister of Westinghouse, who reported research findings in lamp design.

In discussion Ward Harrison of Nela Park reminded the convention that every new light source introduced has been misused and over-promoted as a current-saver but finally had increased usage of light and brought reductions in cost both of lamps and current with increased business.

Answer to both the stroboscopic and power-factor difficulties was given in the Progress Report, Tuesday evening, made by O. P. Cleaver of Westinghouse Lamp Co. with a stageful of new lighting devices, gadgets and control equipment. It was a new twin auxiliary, one element furnishing lagging, the other leading current, the two bringing about a balance and correcting stroboscopic effect at the same time. He also demonstrated the new 40-in. lamp, the mercury-arc flourescent industrial unit, numerous fixtures and glass and plastic control media. A list of the new lighting ideas and devices presented would read like a mail order catalog; even flea killers for dogs, insect-trap lamps, a steam generating lamp, a taillight for pedestrians. Alston Rogers of GE, Los Angeles, stooged as a fluorescent Harpo Marx.

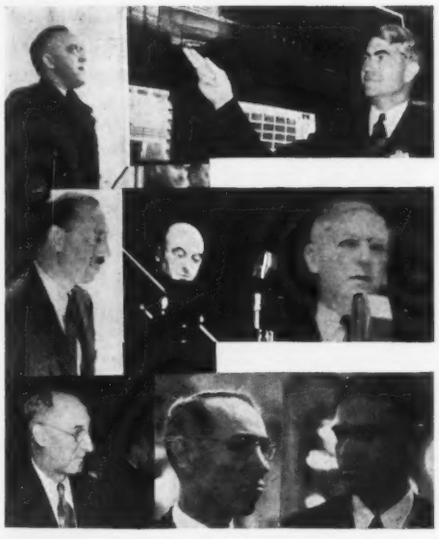
President D. W. Atwater, both in his presidential address reviewing the raising of levels of illumination during the past 25 years, and in floor discussion, commented on the new fluorescent light sources, reminding of the concern over tungsten filament lamps when first introduced.

The two world's fairs, in San Francisco and New York, were used frequently as illustrations of the employment of these and other new light sources and equipment. A. F. Dickerson, GE, Schenectady, described the Golden Gate International Exposition exterior decorative lighting and Wm. P. Bear, Pacific Gas and Electric Co., how lighting was used in exhibits and interiors. O. P. Cleaver and C. S. Woodside, of Westinghouse, substituted for R. C. Engelken and Samuel G. Hibben, (Westinghouse), in describing the New York fair exterior and interior illumination.

Principal difference in the lighting of the two fairs seems to have been that of purpose, for the same light sources and in many cases similar techniques were used. The New York fair buildings are functional in character, and lighting thus becomes a part of the architecture. Decorative lighting at the San Francisco fair is psychological, designed to create a mood and of itself to be inconspicuous and concealed. New York's buildings, though conforming to a general style, are individual and lighted as individual structures. Those of San Francisco are part of a

PROGRESS in lighting was shown by O. P. Cleaver with a trainload of new devices and light sources. Val Roper shows the new sealed headlamps. Matthew Luckiesh between Pittsburghers L. D. Morgan and J. A. Hoeveler. U. of C. researchers F. A. Ryder, J. T. Gier, A. R. Anderson, W. E. Mason, E. D. Howe and L. M. K. Boelter. Northwesterners R. Hall, Walt Potter, G. B. Bocarde and Ross McElroy. Los Angeles sent Foster Sampson, Arthur W. Nye, H. J. Mayo and George Rankin. Industry cooperation at work, the volunteer lighting committee — Bill Wuelker, manufacturer; Garth Chamblin and L. F. Casey, contractors, and Nate Graves, of the utility

PERSONALITIES at the IES convention: President D. W. Atwater, Convention Chairman O. R. Doerr, Vice-president Willard Brown, new President L. H. Graves, Matthew Luckiesh, C. S. Woodside, L. M. Ketch, Rudolph Staud, A. B. Oday, Romaine Myers, Leland H. Brown, A. W. Ray, Vice-president A. D. Cameron, Ted Bakeman, Frank Hansen, Foster K. Sampson, L. B. Gawan, Earl J. Reeder, A. F. Dickerson and L. A. S. Wood, all active in the program



romantic atmosphere reflective of the cultures and architectures of the Pacific Ocean region. At night lighting is used to create enchantment and oriental splendor.

At the banquet Wednesday night Dickerson was presented a scroll from Leland Cutler, president of GGIE, by W. P. Day, director of works, "in tribute to the Modern Aladdin whose genius created a magic City of Light on Treasure Island."

Research into lighting and seeing furnish the foundations for illuminating engineering. Eminent are the society's top rank research men. Matthew Luckiesh best known of all, clarified the philosophy underlying research into seeing at a joint luncheon of the IES and the San Francisco Electrical Development League Monday noon. Dramatic contrast was given his contentions by his comparison of the progress in electricity and in the tools (the lighting equipment) with which to bring humanity the full blessings of electric light in the 100 years since Faraday began the fundamental experiments that give birth to the industry.

That until recent research in seeing, engineers had the product, and the equipment but had nothing basic as to how much light to specify, he maintained. The reason they recommended 10 ft. candles was because the most that people had before was five and they knew that 10 wouldn't hurt them. Now knowledge of the amount of light needed exceeds the possibility of furnishing it. It resolves itself now, said Luckiesh, into a matter of balancing the penalties of poor lighting against the benefits of good lighting. Artificial light is not merely a necessity now, but a benefactor. And the practitioner of lighting, he concluded, should know at least as much of the scientific background of the science of seeing as the physician knows of the background of his required sciences.

Luckiesh had to leave the convention on account of a bereavement so the paper he and his associate, Frank Moss, had prepared was presented by Walter Potter, GE Lamp, of Portland. In it blinking and nervous tension measurements developed important data as to brightness and contrast in respect to seeing. A. D. Cameron, vice president of Holophane Co. reading a paper by H. L. Logan of his company, reported on research into brightness levels out-of-doors. Much previous conjecture as to sky brightness is dispelled by it and a reason found for the complaint of too high ceiling brightness in high intensity indirect lighting. Genuinely needed performance data as to transmission characteristics, reflection values, etc. of plastics were reported by A. F. Wakefield, Wakefield Brass Co., and M. H. Bigelow, of the Plaskon Co., Toledo, O.

The Laboratory Session Tuesday brought forth experimental results from University of California and Massachusetts Institute of Technology on photoelectric photometers, for comparing light sources, and of the flicker type. L. M. K. Boelter and associates from U. C. were declared by Leland H. Brown of Stanford to have made the most important contribution to illuminating engineering in 10 years with a mechanical integrator for determination of illumination from diffuse surface sources.

They also reported on automobile headlamp operating conditions to the street lighting session. This session was a vital one this year, with explorations into both headlamps (by Val Roper and K. D. Scott, GE, Nela Park) and overhead lighting (by L. A. S. Wood, Westinghouse, and Kirk M. Reid and H. J. Chanon, GE) Romaine Myers, of Oakland told of controlling daylight at tunnel entrances by means of louvers.

A joint luncheon of the IES, the California Safety Council and San Francisco Junior Chamber of Commerce, Wednesday, was addressed by Earl J. Reeder, chief engineer, National Safety Council, Chicago. He urged a progressive approach to the problem, lighting first the most needed streets, regardless of adjacent economic considerations.

School lighting was most grippingly discussed by A. W. Ray, superintendent of Sausalito schools with a paper that should have been in the IES program rather than that of the National Lighting Sales Conference. Right to the roots of democracy goes education, and a "seeing environment" is more important to acquiring intelligence than any other, was his warning. Photoelectric classroom control was discussed by D. P. Caverly, Hygrade-Sylvania Corp.; natural daylight control by means of blinds, shades, etc., by Leland Brown, Stanford; daylight variations by H. L. Johnston, Pittsburgh.

Home lighting—for the farm—was investigated by Myrtle Fahsbender, of Westinghouse Lamp Co., (reported by Cleaver) who told of inexpensive package units containing a group of good farm home lighting fixtures. E. W. Commery, GE, Nela Park, reported a test survey of home lighting which indicated less than 50% saturation of IES lamps.

C. T. Bakeman, Puget Sound Power & Light, urged an united industry story to the public in making contacts. Lou Gawan, Utah Power & Light, described his company's marketing of light. Frank Hansen told how to conduct lighting forums.

More details of the Lighting Sales Conference will be reported in later issues.

League Managers Meet

WITH F. L. Hockensmith, Electrical League of Southern Calif. presiding, the League Managers' meeting swung into action at the Western Merchandise Mart, Thursday morning, Aug. 17. Managers, directors and executives of electrical leagues, bureaus, societies, promotional associations and dealer contact representatives of utilities in the West, sat down to discuss their past activities, and their plans for the future. Out of this get-together came plenty of food for thought.

Following an "Agenda" prepared by Bill Cyr, associate editor of *Electrical West*, the group first swapped sound ideas about "trade ethics and how far to go." This subject, together with a discussion of appraisal bureaus for trade-ins, proved to be the real topic of the day. A way to beat "chiselers" and combat high trade-in costs was outlined by Clark Chamberlain, San Diego County Bureau of Electrical Appliances.

A committee of twelve men, according to Clark, was appointed to draw up a series of trade practice points that needed correction. After a series of meetings, a "Trade Practice Agreement" was outlined and presented to a large group of dealers and distributors and voluntarily offered as a guide to set up a better business program. As a result, two new committees were formed, one of the distributors and one of the dealers. These met once a week, setting down no rigid rules, but attempting to live up to fair business methods and destroy sharp-shooting deals.

This "moral rearmament" program, Clark claimed, was slowly getting a firm foundation. "Refrigeration is the background of this 'chiseling' racket," he declared, "and if it is conquered successfully, we'll have no difficulty in conquering other lines."

Ken Hampton, of Valley Electrical Supply, Fresno, recalled a similar plan put into operation in his territory five years ago, which gave salesmen the proper tools to combat the prevarications of the consumer trade. "We have no difficulty with 'chiseling'," Hampton asserted. "The dealers who won't cooperate amount to only 5%."

"Most important," he continued, "was getting prospects to believe that there was no value to their old ice-box. We get them to junk it," he said.

However, according to Emmett Britton, P. G. and E., San Jose, 15% of dealers don't abide by a "Blue Book" plan inaugurated in his territory. Dealers have been more cooperative though, he declared, since set prices for trade-ins enable them to have a standard and keep to it. He also cited the example of small towns near his area where ice-boxes were taken as trade-ins by dealers and then returned to ice companies. These firms in turn took electric refrigerators as trade-ins and traded with dealers.

Chairman Hockensmith's comprehensive report on salesmanship courses offered in Los Angeles City College, showed the importance of teaching young men the electrical industry before they entered it. "Selling is just as important as any other profession," "Hock" said. "Southern California has coordinated their sales courses with the George Deen Act. We've got student salesmen down there working afternoons and Saturdays on a 40 cent an hour basis. When they finish their courses, we don't guarantee them jobs, but we usually get a lot of good men this way."

"The League in southern California also acts as a clearing house for salesmen," he also pointed out. "When dealers or distributors need men, they come to us," he said.

In the discussion of sales reports, R. Hall of Vancouver, caused a stir of excitement when he declared that dealers were paid $2 for their reports, upon receipt of report.

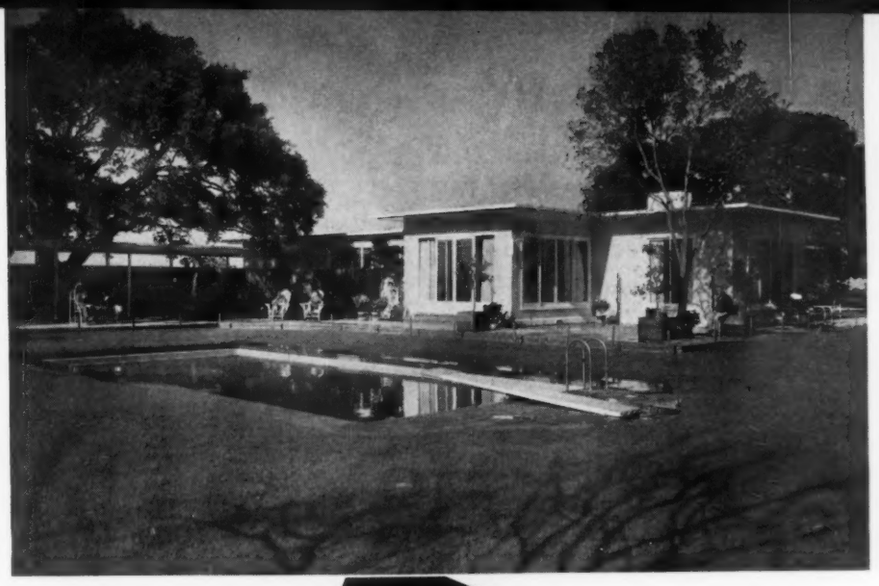
Members were in accord on the league's responsibility in tying in with National Sales promotion. "One week of national advertising is too short for us out here in the West," Ken Hampton declared. "We should point to and cash in on national promotion after it is completed." Hockensmith brought this feeling to the attention of Arthur Schanuel, Adequate Wiring Bureau representative, present at the morning session.

In a section devoted to display, Clark Chamberlain held the spotlight in his description of shows organized by him for San Diego County. "I get cooperation down there," he said, "from the park board for my building, from newspapers and radio stations for my promotion, from dealers and distributors for my space, and from thousands of people who come and don't have to pay a cent to see our shows. Costs were held at a minimum, and public interest pitched high by contests, radio talent shows, with plenty of free give-aways," he concluded.

Those present at these successful morning and afternoon sessions were: F. L. Hockensmith, Los Angeles; J. Clark Chamberlain, San Diego; J. R. Lazarus, PCEA, San Francisco; George W. Barker, PCEB, San Francisco; Elias Strong, Salt Lake City; R. Hall, Vancouver; G. B. Bocarde, Pacific Power & Light, Portland; Vic Hartley, PCEA, Los Angeles; Arthur Schanuel, Adequate Wiring Bureau, New York; Ken Hampton, Valley Electric Supply Co., Fresno; Harvey Edmund and Milo Cain, Coast Counties Gas & Electric Co., Santa Cruz; R. B. McElroy, Washington Water Power, Spokane; and a host of P. G. and E. representatives, B. W. Reynolds, O. E. Rush, Peter J. Maffee, R. W. Hurff, Carl McCarthy, San Francisco; Emmett Britton, San Jose; Geo. W. Graffis, Stockton; M. P. Holton, Marysville; Walter E. Lind, Leo M. Kass, Oakland; Jack Schact, Sacramento; M. C. Merrill, Santa Rosa; E. B. Reineger, Harry Patton, San Rafael, and Bill Cyr and William Gahagan of *Electrical West*.

F. L. Hockensmith is seen here at the 2d League Managers' meeting, driving home a point. Held in the Western Merchandise Mart, Aug. 17, this meeting did much to stimulate and encourage new ideas among electrical league managers. Representatives from all over the West attended the session

SALES PARADE



Built at an estimated cost of $45,000, this unique 12-room home near Atherton, Calif., is a veritable paradise. It was erected as a result of the combined efforts of David D. Bohannon, president of Suburban Builders, Inc.; Gardiner A. Dailey, architect; Thomas Church, landscape architect; James & Waters, civil engineers; Ronald Campbell, town planner, and the Good Housekeeping Studio of Architecture, Building and Furnishing

Night Turned Into Day at Model Home

ADVOCATES of daylight saving will be pleased to hear of a new 12-room home in the rolling hills west of Atherton, Calif., in which Westinghouse Electric & Mfg. Co. has created daylight the day around, electrically. In this $45,000 dream house in the Woodside Hills, near San Francisco, Westinghouse has installed tubular glass lamps, which produce artificial daylight by fluorescence, turning electricity into invisible ultraviolet radiation, then transforming its wavelength to make it visible.

The result is a combination of colors which produce the effect of sunlight, 20 times more efficiently than the best formerly obtained from color matching equipment using filament lamps with filter glasses.

Nearly a mile of copper wiring carries the electrical energy to operate the interior lamps, the household electric appliances, the floodlights and underwater lamps used in illuminating the patio and swimming pool.

While the average home has fewer than 30 outlets, this beautiful home has 134 electrical outlets, with a connected load of 70 kw. Daylight visibility in the 1¾-acre grounds is provided at night with four main floodlights. Two of them, in the front of the house, use 1,000-watt lamps. At the rear, two 1,500-watt "spots" play upon the patio, swimming pool and garden.

This unusual home, known as the 1939 Exposition Model Home, is the ultimate in "electrical living," that makes for a happier life indoors, and outdoors, too.

Above right picture shows darkness being turned into day on patio and swimming pool with Westinghouse floodlights. Five "Aqualux" underwater lights convert pool into a mirror of light. Living room at direct right is full of artificial daylight, created by fluorescence lamps. These tubular glass lamps, developed in Westinghouse laboratories, utilize a very low pressure mercury vapor which produces ultraviolet radiation. Chemical coating on inside of glass surface glow when struck and changes invisible rays into visible light. Bottom left is general view of kitchen, with Monel finished working surface. Equipment includes 13½ cu.-ft. refrigerator, a large range, built-in cabinet dishwasher, "Automeal" roaster, all made by Westinghouse

Future Campaigns

Utilities in the West carry sales programs into fall season

Sales promotion is clicking throughout the eleven western states and British Columbia. Plans continue on for the coming months. Here's a list of the activities of a few:

British Columbia Electric Railway Co., Ltd., —Annual employees' lamp globe campaign. Sept. 15-Oct. 31. Company exhibits at annual Victoria Exhibition—Aug. 28-Sept. 4, including general appliances, promotional display, separate agricultural exhibit and special "Better Wiring" booth.

Los Angeles Bureau of Power & Light—Range campaigns for Sept. and Oct. Expositions during Sept.

Montana Power Co. — Mazda lamp campaign for October.

Nevada-California Electric Corp. — Refrigerator campaign for Sept. Water heater campaign for Oct.

Puget Sound Power & Light Co. — Water heater, refrigerator and general lighting campaigns for Sept. and Oct. Display at Western Washington Fair, Puyallup. in Sept.

Seattle City Light—Range and automatic water tank heating campaign for Sept. Range and better lighting campaign for Oct. In Sept. a series of 16 electric cooking demonstrations. For Oct. advertising and field demonstrations of IES lamps. Continuance of electric rate cut sales campaign, featuring electric range wiring for $15. Free installation of automatic storage tanks.

Southern Colorado Power Co. — Range, water heater and IES lamp campaign for Sept. Light conditioning campaign for Oct.

Utah Power & Light Co.—Lamp bulbs, residential and commercial lighting, major and small appliances, stokers campaign for Sept. and Oct.

Mountain States Power Co. — Range and light bulbs campaign for Sept., IES lamps and lamp bulbs, Oct.

Public Service Co. of Colo.—IES lamps and commercial lighting, street lighting, refrigeration and air conditioning campaigns for Sept. and Oct.

Southern Colorado Power Co., Pueblo, Colo. —Ranges, water heaters and light conditioning campaigns for Sept., light conditioning and lamp bulbs, Oct.

Southwestern Public Service Co. — Yard lighting and roaster campaign for Aug., sight saver and Better Light-Better Sight in schools campaign for Sept.

Western Public Service Co., Laramie, Wyo., and Las Animas, Colo.—Pin-it-up lamps, light conditioning and light meetings, Aug., Pin-it-up lamps, light conditioning, commercial lighting for schools campaigns for Oct.

HUNDREDS OF BUYERS, interested in the newest developments in imported and domestic merchandise, attended the Fall Gift, Lamp and Housewares Show held Aug. 9-12 on the 5th floor, Western Merchandise Mart, San Francisco. Many dealers welcomed this opportunity to select merchandise for their fall and holiday stocks. On Friday evening, Aug. 11, showrooms on the 4th and 5th floors were the scene of an "Open House" to the trade. This semi-annual divisional trade inspection evening, which combined the radio and appliance division with the lamps, gifts and housewares departments, proved to be highly successful. Instructive displays and helpful demonstrations of new developments and selling methods have made this event a popular one with dealers, buyers and exhibitors.

APPLIANCE SALES REPORT, 1939

A Summary of Dealer and Utility Reports Compiled by Associations, Societies, Bureaus, or Dealer Contact Departments of Utilities

REPORTING COMPANIES	Idaho Power Co.[1] Current	Idaho Power Co.[1] 7 Mos.	Northwestern Elec. Co.[2] Current	Northwestern Elec. Co.[2] †Mos.	Montana Power Co.[3] Current	Montana Power Co.[3] †Mos.	P. G. & E. Co.[4] Current	P. G. & E. Co.[4] 6 Mos.	San Diego Cons G. & E. Corp.[5] Current	San Diego Cons G. & E. Corp.[5] 6 Mos.	San Joaquin Power[6] Current	San Joaquin Power[6] 7 Mos.	Southern Calif. Edison Co., Ltd.[7] Current	Southern Calif. Edison Co., Ltd.[7] 7 Mos.	Utah Power & Lt. Co.[8] Current	Utah Power & Lt. Co.[8] 6 Mos.	Wash. Water Power Co. Current	Wash. Water Power Co. †Mos.
Ranges	362	2,172					395	1,881	47	230	119	819	147	1,202	409	1,881		
Water Heaters	192	1,062					298	1,462	44	186	56	426	75	466	144	606		
Air Heaters, aux.	7	253					87	2,076	40	727	1	124			22	367		
Air Heaters, 220	1	105					107	528			44	342						
Refrigerators	911	3,516					5,885	24,495	921	36,666	640	4,221	3,645	22,291	1,395	5,184		
Dishwashers	2	12					11	89			2	16			2	21		
Washers	354	2,823					2,717	15,372	352	2,042	348	2,166	2,146	14,855	836	4,306		
Ironers	15	229					483	2,673	41	279	53	302	266	1,829	44	311		
Vacuum Cleaners	88	931					2,711	15,850	220	1,412	93	632	801	7,514	433	2,281		
Radios	428	4,129					8,933	52,490	917	5,148	533	3 831	3,413	28,491	1,072	8,867		
Mixers							253	1,594	132	529	31	271	198	1,638				
Cookers, Casseroles	57	217							41	263	6	29	44	246	12	69		
Irons	503	3,140							478	2,288	360	1,772	947	7,097	1,072	5,659		
Waffle Irons	106	786							178	907	87	539	252	2,173	262	2,013		
Toasters	185	1,353							380	1,805	118	805	421	3,276	419	2,166		
Table Stoves	648	1,943							67	366	39	186	158	1,353	530	1,580		
Heating Pads	17	472							66	725	18	239	40	1,051	104	1,058		
Curling Irons													26	280	127	753		
Coffee Makers	177	1,325							404	1,895	122	866	235	1,822	127	901		
Sewing Machines							455	2,787	66	613	15	68			165	1,006		
Clocks	105	856							375	1,813	135	927	425	3,182	240	1,738		
Fans	945	1,217									215	587	583	1,404	99	198		
Floor Polishers																		
Sun Lamps	5	140											8	255	6	47		
Reflector Lamps											135	1,256						
Misc. Lamps	498	3,486																
Shavers													188	1,428				
Yard Lights											50	316			17	186		

SOURCES

[1] Figures compiled by Electric Equipment Sales Association. Include power company sales of all reporting dealers.

[2] Lists appliances sold by dealers in Portland area. Figures compiled by Northwestern Electric Company.

[3] Combined dealer and company sales from report of Montana Power Co.

[4] P. G. & E. reports sales of major appliances only based on accurate reports from dealers' accounts. Ranges, water heaters and air heaters include company and dealer sales. * Due to delays in compiling report current and total figures are always one month behind those figures of companies reported in other columns of this table.

[5] Gathered by Bureau of Radio and Electric Appliances of San Diego County. Estimated monthly sales figures used in this table: Miscellaneous figures includes fans, curling irons and sun lamps.

[6] Compiled from dealer reports by Merchandising Division of San Joaquin Power.

[7] Includes reports from dealers on San Joaquin Valley system of company as well as Southern California areas served.

[8] Includes Utah Power & Light Company territory in Utah, Idaho and Wyoming. Also Western Colorado Power Company territory.

† July figures were not available at time of going to press.

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No. 9-c SEPTEMBER 1939

Electrical West

Sales Guide

Step into the Lighting Season

Here is what the IES tag means—tell this to your customers and sell the better lamp, better for light, better for sight.

IES means Illuminating Engineering Society, a professional society with the standing of the medical associations. It set up 54 requirements for a lamp before it could receive its seal or tag of approval.

These 54 points include 11 for seeing safety, 14 for electrical safety, 29 for mechanical safety and quality. Of the 54 requirements 39 cannot be seen by ordinary inspection. Therefore Electrical Testing Laboratories have been designated to check manufacturers.

An IES lamp must be stable, must have an approved Underwriters labeled cord, must be firmly connected. The translucent bowl must conceal the bright filament, yet pass a certain percentage of light downward. The wide shade is required for spreading illumination in a wide circle, with definite foot-candle ratings at 18, 24 and 30 in. from the lamp. Height of the lamp has a definite relation to light spread. Shade material must have a high reflection too.

All these reason-why points have a definite value. They build up the quality and make the price shrink in comparison.

What I·E·S· Lamps mean to you

Inherit five years of promotion and several million dollars worth of publicity

Every certified I E S Lamp sold during the past five years has carried a tag. That tag represents two important things.

To the public it represents a lamp built to 54 standards of lighting performance and construction quality.

To you it represents a paying investment in national advertising and publicity that you couldn't buy for several million dollars. Manufacturers and utilities all over this land have advertised the IES Lamp and Better Light for Better Sight.

Nearly four million IES lamps have been sold, and every one has created acceptance for more.

Today a wider variety of styles and models offers a choice that should meet the most particular demand. Whether you carry a big stock or not, attractive catalog sheets illustrate available models you can order.

This is what you inherit as you step into the fall and winter lighting season. It is a legacy of public acceptance, of real demand for better light, of better merchandise to offer and a full chance to profit with every sale.

Instead of selling "just lamps" and meeting the competition of flashy and cheap equipment on a low-price basis, with the IES lamp you have something definite to sell up to. Refresh your memory from the sales reasons in the remainder of this Guide.

What to Say

When you sell Seeing you'll sell better lamps

Salesmanship is the gentle art of letting others have **your** way, says **Business Week.** As applied to selling lamps this gentle art consists of creating a want for good light, and in particular your lamp, by creating first a desire to see better, more comfortably, more pleasurably. The lamp, after all, to the customers is a means to that end.

At present most lamps are **bought** by a woman chiefly because she visualizes it as a piece of attractive home furnishing. She sees it in her mind's eye in a room and in a place in that room that she feels needs a lamp. It isn't until she has a headache or becomes sleepy while trying to read or sew under that light that she realizes she has cheated herself. That's why she buys far fewer lamps than she needs.

So when you help her to picture to herself comfortable reading, enjoyable reading or sewing, combined with a stylish lamp, then she begins to see it your way.

Often a salesman becomes so familiar with the benefits of good lighting that he takes it for granted the prospect does too. It is surprising to find so many who have not thought about it. A few well chosen words sets them thinking about it in connection with the lamp you are selling.

In the next two columns you'll find some of these well chosen words that you can use.

"Have you thought of the new lamp you want in terms of comfortable seeing? Let me explain what I mean—

"You want to protect the most precious sense you have, the sense of sight. Any loss in the efficiency of your eye requires professional attention. It also takes a great deal from the enjoyment of life. Sometimes headaches and nervousness are due to eye-strain from poor light.

"Make the things you do that require close eye work, such as study, reading, sewing, or hand work easier. Good lighting speeds up your ability to see. This makes it quicker to absorb what you read or to perform the hand work more accurately.

"Do your children twist and squirm when they read? They may be trying to get out of their own shadows or to escape glare on the book they are reading. Good ligthing has a tendency to promote a more healthy, upright posture. It is comfortable for anyone to read in a natural sitting posture in a well lighted room.

"A safer home, the well lighted one. Light spreads to all parts of the room. No half-seen objects lie in wait to trip you in the gloom.

Recommended by Your

THE MONTANA POWER CO. • UTAH POWER & LIGHT CO.
IDAHO POWER CO. • CALIFORNIA OREGON POWER CO.

"Yours will be a cheerful home, and a colorful one with better light. All the colors, decorations and patterns will be seen at their best, in their true colors. The furnishings or dresses you select in the store under fine lighting will look just as good when you get them home as when you bought them.

"Your own appearance, and that of your guests will be better under softened, well distributed light. Harsh, unflattering shadows won't make them look older and tired or sick when you chase the shadows away with well diffused light. Your background too will be attractive. The color in your gown just right.

"Pep up with light. It relaxes the nervous system when you do not have to strain to see. It prevents that tendency to yawn and grow sleepy from eye fatigue. You and your friends will enjoy a more sociable and carefree evening of bridge, for instance, with cheerful lighting.

"Have you noticed how you blink when you lift your eyes from a bright page to look into a dark room while you are reading. That takes a violent eye adjustment. Scientists find that the room should have at least 10 percent of the light evenly distributed about it to avoid this violent change."

When you show the prospect the need for better seeing you set the stage for a long series of lamp sales instead of just one. When the new IES lamp is brought home the contrast it makes develops the want for new lighting throughout the house. The living room will need another IES lamp, the children's rooms study lamps, the bedrooms pin-up or bracket type lamps, the kitchen and bath rooms better units. There are end-table lamps for the couch or easy chair. Lamps for the vanity and lamps for the dressing room mirror.

Every home can use several of the bracket-type hanging or pin-up lamps. Their special advantages are: "well designed, easy to look at. They add variety to the decorative scheme and can be changed easily to new locations to freshen up the room. They brighten corners or hard to reach places that a floor lamp cannot—over a couch, a writing desk, telephone table, or some plants or flowers. They make an attractive and a satisfactory bed lamp."

Shades and adaptors make a profitable side line. All the home lighting advisors of the utility talk of them as convenient and inexpensive means of converting old style fixtures to produce comfortable light. The lighting season will bring people asking for them. Magazine articles too, create this demand. Sell them.

Winter time is the season too for health and sunlamps. Might as well be lamp headquarters and step into more profit with the season.

Sales Allies —
PUGET SOUND POWER & LIGHT CO.
PORTLAND GENERAL ELECTRIC CO.
WASHINGTON WATER POWER CO.

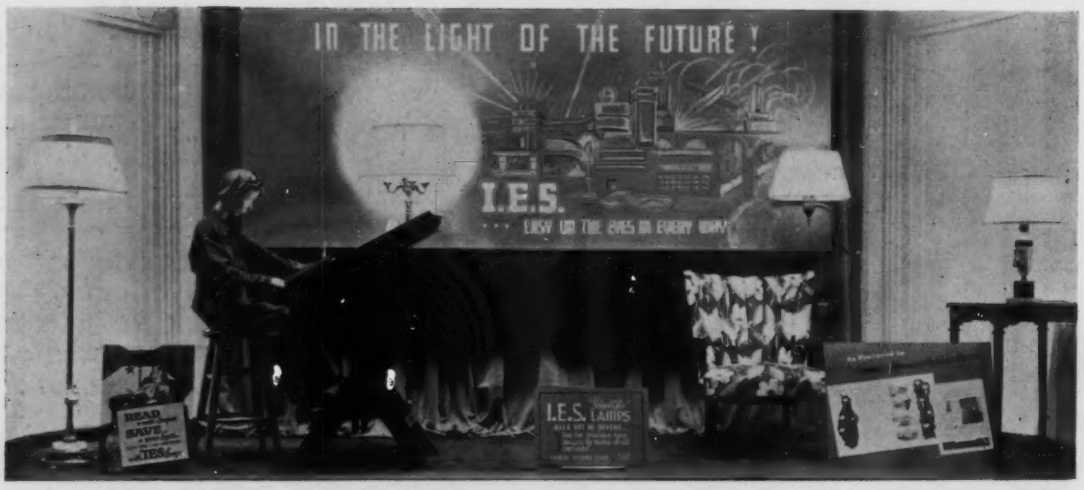
to
profit by
fall and winter
seasons, Sell
I-E-S-Lamps

What to do—

Let them See

what your lamps look like

Meant to see by, lamps are bought on sight. Hence to sell them, they should be displayed. How to display them in windows is often a puzzle. The window full of lamps, artistically arranged, several of them lighted is standard practice, and always effective. It depends on the looks of your lamps for pulling power. A window that tells the "reason why" a person should buy takes more planning. One of the best of that kind is shown below. It dramatizes the need for good seeing.



Inside the store give your lamp stock the advantage of home atmosphere if you want to make more sales. It helps the woman to visualize the lamp she wants in surroundings like those of her home. While an ample stock is desirable, crowded display space is apt to confuse the purchaser instead of helping her to select. Lamp shades are often an important factor in deciding the sale. A revolving rack like that shown at the left is helpful in permitting the "trying on" of various shades. Any woman likes to do some selecting. Help her to do it easily and save your time and hasten your sales.

—and How

Movable Kitchen

Model electric kitchen shown at fairs draws real crowds

By SYDNEY W. GREEN
Advertising Department, San Joaquin Power Division, P G & E

San Joaquin Power Division, P G and E, is showing a modern electric kitchen in operation at various fairs and exhibitions. At the first presentation at the Santa Barbara County Fair in Santa Maria, this "live" electric kitchen was a center of real interest during the four days of the fair. More than 4,000 inspected it, which was 30% of the total adult attendance.

The white kitchen, shaded with pastel blue, is equipped with an electric range, sink disposal, dish-washer, electric water heater, refrigerator, exhaust fan, steel cabinets with interior lighting, modern kitchen lighting, adequate wiring, clock, radio, telephone and a public address system. Small appliances also are part of the exhibit.

It is so constructed as to be taken apart for transportation on a truck. This design required much ingenuity on the part of the draughtsmen and builders, who strongly reinforced the floor, building it in four bolted sections. The floor covering is dark blue marbeled linoleum with a cut-out star design in the center.

The walls are made of two thicknesses of ¼-in. ply-board braced by one by three strips on sixteen in. centers. This construction is quite rigid yet very light weight. The back wall consists of three panels tied to columns at each end. In the columns are entrance switches and power distribution centers. Wiring is with BX securely fastened to the back of the panels. Plug and socket connections are used between panels where wiring must be broken for transportation.

Hot and cold water lines are connected with short sections of rubber hose at points in the back wall, for convenience in moving. A perforated tank sunk in the soil provides a temporary means for disposing of the surplus water from the dish-washer and disposall. Most fairs are held on bare ground under tents, which makes this method possible.

The lighting is modern, consisting of two Holophane ceiling lights, a marine-type center light, soft lights over the sink, and local lights under the steel cabinets. Automatic lights also are installed in the steel cabinets and bins. The display lighting consists of lumiline tubes back of cutout letters. Two-way switches, a control board, and ten duplex convenience outlets provide ample opportunity for demonstration of adequate wiring.

About eight hours time is required for the assembly of the kitchen, ready to show. The entire exhibit is transported on a one and one-half ton truck.

All visitors are given a chance in a drawing, also a small folder telling about the exhibit and the free advisory services offered by the power company. The five essentials of a modern home, proper lighting, adequate wiring, automatic hot water, modern kitchen, and air conditioning also were plugged in the folder.

Among the services offered, and one that meets with much interest, is a kitchen planning department. Free layouts in color are offered tailored to the dimensions of the individual's home. The home service division of the Valley Electrical Supply Co. handles the demonstrations.

The kitchen was designed and built under the direction of the Merchandising and General Sales Divisions of San Joaquin Power Division, P. G. and E., in Fresno.

Crowds like this were attracted everywhere San Joaquin Power Division's model kitchen was shown. It toured local fairs in southern California. Tickets on a drawing were among the attractions

ELECTRICAL DEALERS in Eagle Rock, Calif., cooperating with one another, recently staged a 7-day Electric Home Appliance Show that attracted large and enthusiastic crowds. It was one of the first dealer promoted and sponsored activities held in Eagle Rock. Dealers who took part in the show were: Campbell Electric Co.; Howard's Electric Shop; Hulbert Stores, and Roberts & Roberts. Every day during the show, Mrs. Mercedes Gaffney, Bureau of Power & Light home economist, directed a cooking demonstration.

MOST SUCCESSFUL was the Electric Cookery Observation Quiz conducted by the Inland Empire Electrical Equipment Assn. for eight weeks during the recent summer months. The final quiz, which asked 12 questions and concluded with asking participants their pet kitchen peeve, was held week of July 30 to Aug. 5. Loose leaf recipe binders were given to all contestants.

A REFRIGERATION "RECIPE BOOK" campaign, staged by the San Diego Farm Bureau of Radio & Electrical Appliances is meeting with enthusiastic response. Beginning Aug. 1, the campaign has moved steadily along, increasing refrigerator sales and stimulating floor traffic. This promotion is built around a beautiful recipe book called "Under 50 Fancies," which is placed in the hands of all dealers, without cost. An attractive window card, calling attention to the booklet, is also available at no cost. A new radio program called "Leisure House" was put on the air during August over KGB, every Monday, Wednesday and Friday from 9:45 a.m. to 10:00 a.m. Throughout the same month newspaper campaign tied in with this booklet give-away.

Music Merchandised

Music store remodeled with customer psychology in mind

A very definite and well-founded plan lies behind the recent remodelling of the May Music Co. store in Albuquerque, New Mexico. Bernie May, manager, of the organization, which boasts one of the largest retail turnovers of musical instruments and electrical appliances in the Southwest, is a student of customer psychology. Make the customer comfortable, eliminate interruptions and distractions, he says, and sales are noticeably easier to make. With this thought in mind, May has departmentalized his establishment with a clear-cut reason for the location of each display or department.

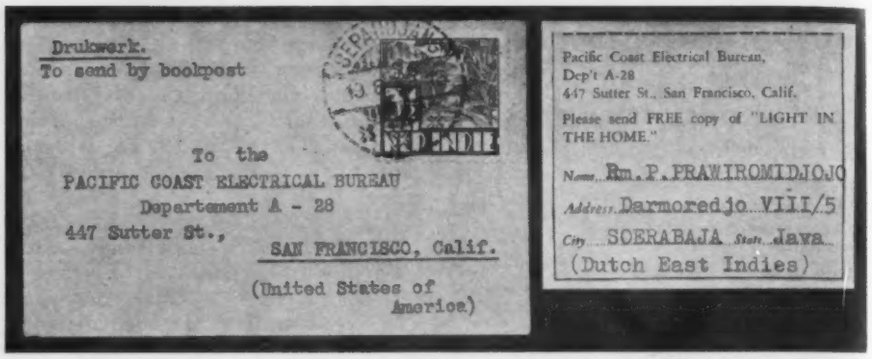
The front part of this store carries a considerable range of merchandise, the idea being that the power of suggestion through visual contact frequently awakens the interest of the casual shopper in some major appliance or instrument. Interest having been established on the part of such potential customer, he is deftly conducted to the appropriate display room, away from the door. Radios, for instance, are segregated in sound-proofed rooms on the new balcony of the shop. Easy chairs and smoking stands are invitingly at hand—even the low ceiling contributes in giving the restless customer the impulse to be seated, to relax. The salesman, in the midst of a demonstration, is never called to the telephone, or disturbed in any way. The prospect has his continuous and courteous personal attention.

"Why choose the balcony for this particular class of merchandise?" May was asked. "For several good reasons," he replied. "In the first place, the short climb upstairs has a tendency to make the customer wish to be seated—radios should be demonstrated only to people relaxed in an atmosphere as nearly homelike as the merchant can achieve. Then the physical characteristics of our merchandise have a bearing on the subject, no great weight is involved in our radio display, the radios themselves are easily carried up and down, and the balcony is subjected to a comparatively light load. The question of sound-proofing also enters into the selection of this location. The rooms for radios and those for record demonstrations, also on the balcony, are completely sound-proofed without the rest of the store being affected."

The main floor of the May store is well arranged for effective display and sales. Musical instruments are grouped with the exception of pianos, which have their own display and demonstration rooms. An ultra-modern General Electric kitchen unit serves as the central feature for a complete showing of major electrical appliances for kitchen use. Washing machines are segregated in another location, while a bank of shelves in one corner holds an array of small electric household conveniences. Well toward the rear of the store is located the office and cashier's desk where payments are received and other business transacted after the outsider has passed various attractive arrangements of the shop's offerings.

In the extreme rear of the store the radio service and repair section has just been fitted with new equipment, including oscillograph, multimeter, and signal generator, making it one of the most completely equipped departments of its kind in the Southwest.

With the installation in the next sixty days of a new building front with modernistic display windows now being planned, the May store will have been modernized in every detail.



Last month activities over at the Pacific Coast Electrical Bureau veered for a moment to assist a fellow worker who had received the coupon above. The name and address were the cause for commotion. Note: Rm. Prawiromidjojo (pronounced Prairie-meet-o-o- (the j's are silent), at Darmoredjo, VIII/5, in Soerabaja, Java, Dutch East Indies, is being sent his free copy

PUGET SOUND POWER & LIGHT Co. turned out another sparkling full page ad late in July, when it asked the people of Washington—"Let's Work Together for the Public Good." Following was an open letter to the people by Frank McLaughlin, Puget Sound president. McLaughlin urged them to make the most of Bonneville and Grand Coulee. "You can't eat kilowatts," he stated. "A market must be found for the output. This market can best be obtained through able leadership, the cooperation of the people and the coordination of the facilities."

Artwork showed Uncle Sam plugging in a wire to the two giant outlets, Bonneville and Grand Coulee.

THE PENNY BUDGETER, a new "closing" sales help, has been made available to dealers and salesmen by the Westinghouse refrigeration department. Offering dramatic and convincing proof of the economy of electric refrigeration, the salesman inserts pennies in a slot in the device to illustrate the savings per day that can be effected through the purchase of a new electric refrigerator. As he places them in the Budgeter, he manipulates them so they are passed through a slot to the opposite side of the cardboard. When he reverses the card, the savings, or pennies, indicate just what model refrigerator the customer should have, and show that the savings per day, based on the prospect's own estimates, will actually be sufficient to purchase the model needed.

SLATED to start this month, a new General Electric advertising campaign is designed not only to sell merchandise but also to promote an electrical standard of living which will be embodied in the slogan "It's Easy to stay Young—Electrically." The full line of G-E appliances (except heating and air conditioning) will be presented, and merchandising tie-ups with personal retailing promotions stressed. Sixteen men—eight from G-E, and eight from the Maxon Inc. advertising agency are on the road now in behalf of the campaign. They'll visit principal distributors, and in group meetings, present the campaign. G-E will also hold several prize contests for distributor's salesmen.

ELECTRILIVING is the theme of an Adequate Wiring campaign presented by Pacific Gas & Electric Co. from Aug. 10 to October 10. This advertising is supporting a special electric range and water heater promotion which will be featured throughout localities where P. G. and E. serves electricity only, and in some of the combination gas and electric territories.

Council Contest

Salesmen to compete for cash in Commercial Electric papers

Five awards, totalling $200 in cash prizes, are offered by the Commercial Electric Cooking Council for papers by salesmen on "How I Sell Electric Counter Cooking." Any dealer or utility salesman in the United States selling electric counter cooking appliances is eligible to compete.

The contest is designed to bring out from men in the field their experiences and successful methods of selling electric counter cooking equipment. The papers will be used for publicity and advertising purposes in order to give all salesmen the benefit of these experiences and for the general promotion of commercial electric cooking. First prize will be $100, 2nd prize, $50, 3rd prize, $25, 4th prize, $15, and 5th prize, $10. In case of a tie, duplicate prizes will be awarded.

Entries will be received from Sept. 5 to Oct. 31, inclusive. Papers are limited to 1,500 words or less. Awards will be determined on sales ideas and methods which have proven successful and which the contestant believes will help other salesmen in their work (50%); clarity of expression (20%); originality (20%); and neatness (10%). Papers may be illustrated with photographs, but these are not essential.

Judges selected for the contest are Philip S. Salisbury, general manager and executive editor of *Sales Management* Magazine; Harris E. Dexter, chairman of the general sales committee of Edison Electric Institute; and Henry G. Dooley, associate editor of *Electrical World*.

This contest offers electric counter cooking salesmen an opportunity to cash in on their own experience in a contest planned exclusively for them. Entries are given an opportunity to compete for substantial cash awards, win national recognition if they place among the winners, and to benefit in their own work through the increased use of commercial electric cooking that the contest will help to promote. If your company does not have Terms and Conditions of Contest available, write at once to the Commercial Electric Cooking Council, 420 Lexington Avenue, New York, N. Y.

Award to Anderson

A. A. Anderson, Pacific Gas and Electric Co., Dinuba, Calif., copped first prize in the Modern Kitchen Bureau's second quarterly contest for letters by retail salesmen. The $25 award went to Anderson for his paper "How I Sell Electric Water Heaters." Anderson's theory is that the "best prospects for electric water heaters are those customers who have installed electric ranges or other major appliances and whose monthly consumption is such that the additional energy will be in the lower brackets of the rate. Customers that have other major appliances are 'electrically minded,' and are more easily sold," he stated.

A $5 honorable mention went to G. C. Cochran, Puget Sound Power & Light Co. The next Modern Kitchen Bureau letter contest closes Sept. 30, and the final contest Dec. 31, when a grand prize of $100 will be awarded for the best letter of the year.

DUPLICATE CASH AWARDS by the Edison G-E Appliance Co., Inc., will be given to the dealer whose winning window in the Modern Kitchen Bureau's contest, from Sept. 1 to Oct. 31, features Hotpoint water heaters exclusively. W. A. Grove, manager Hotpoint advertising and sales promotion department, stated that an additional window poster and reproduction of Better Homes and Gardens national advertisement will be included with each Hotpoint water heater window display ordered during the campaign.

A PROMOTIONAL PROGRAM for financing the sale of small electrical appliance sales is to begin shortly, sponsored by the Rural Electrification Administration. REA tried out the idea last spring in the East, whereby sales were made through distributors, and a two to five year credit for purchasers was financed by RFA. Installment collections are to be handled by farmers' electricity cooperatives. It is planned to broaden the program geographically and include both household and farm appliances. Sales will ordinarily be made through distributors or retailers, and through cooperatives where no other outlet is available.

G-E Promotion

"Mrs. Cinderella" is featured in new home service contest

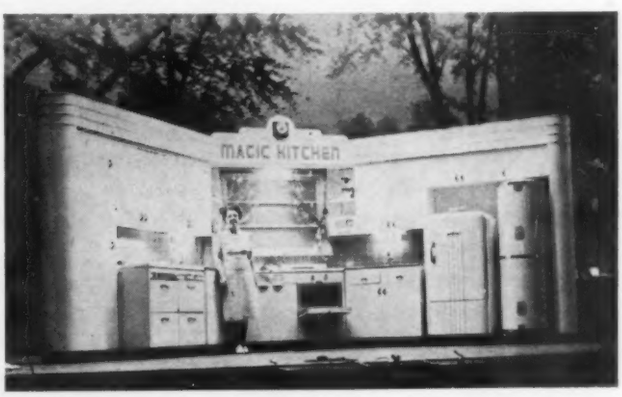
"Mrs. Cinderella" Home Service Contest conducted by the General Electric Specialty Appliance Sales Division, got under way September 1, and will continue until Nov. 30. The contest provides a theme for making every home service demonstration more interesting and effective, and gives home economists and home service directors an opportunity to compete for valuable and worthwhile prizes.

The contest is intended to promote widespread use of showmanship in home service activities this fall. It brings to the every-day type of cooking school and demonstration, a brand new dramatic appeal.

A "Mrs. Cinderella" demonstration requires a local young lady, student or teacher of dramatics or expression, dressed in an appropriate costume, furnished free by G-E, to tell briefly in the Prologue, the drudgeries and hardships that she has had to put up with after marrying the prince and taking up housekeeping in a castle. She then explains by reciting from the "Mrs. Cinerella" picture-story book, how the G-E elves brought Electrical Living to the castle and changed her life.

This Prologue is followed by the regular cooking school or demonstration planned for the occasion. "Mrs. Cinderella" should take part in this demonstration, at the conclusion of which she asks the audience to fill out the special Electrical Living Survey Cards. As these cards are returned to her, she distributes free copies of the "Mrs. Cinderella," picture-story books.

Practically anyone engaged in home service work can participate in this contest. The only requirement is that the regular home service demonstration or cooking school be identified with the "Mrs. Cinderella" theme.



This magic kitchen formed the background for a series of cooking schools sponsored in Oregon and Washington by the Pacific Power & Light Co. in cooperation with local dealers. Audrey Herington, Pacific Power home economist, is shown above in The Dalles auditorium

ELECTRICAL WEST

The All-Industry Magazine of Progress

Established 1887 and Incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity"

McGRAW-HILL COMPANY OF CALIFORNIA
68 Post Street, San Francisco

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Youth Must Learn

REVOLUTION within the electrical industry sounds fantastic. But revolution springs from the isolation and suppression of groups which are numerically strong, and we have in our own ranks a pressure group that's growing bigger every day. It's composed of the youngsters of the trade.

Within its own sphere of action, each electric club, league, association or what have you is, in a sense, a representative, democratic body—a cross-section of whatever group it represents. But if one compares the ages of its members to the ages of those in the field it represents, the democratic aspect disappears. Youth is almost nil.

Furthermore, what youth there is is silent. Go to any meeting of such a group and see who does the talking.

Normally, there'd be a constant balance—younger men coming in, older men dropping out. But there's a breech in the ranks, representing the depression years when recruits were few and far between. It's a dividing line between old and young.

To the older men, this may not matter. They know the ropes. To the younger men, it does. They are outsiders looking in.

In San Francisco, a normally energetic group of younger men, well aware of their own short experience, are considering organizing themselves. Eager to learn, they see the futility of continuing a sincere attempt to learn amidst a group which pays slight attention to the needs of those who will be holding the reins in just a few short years.

That such a need should be inflicted on these younger men is a warning to every electrical organization.

The generals of the past few years have a magnificent experience. The generals of tomorrow will need every bit of that and more. For the good of the industry as a whole, a helping hand to youth is vital. To the organizations themselves, a compound of youthful drive and tempered wisdom could benefit both young and old today, would be a sound investment for tomorrow.

Two Plus Two

WHEN someone goes "haywire" on prices—whether it be a manufacturer, a wholesaler, a contractor or a retailer—he either is deliberately throwing propriety and ethics to the winds, or else he is showing a sad lack of knowledge of simple arithmetic. If it is the latter, then he is inviting an inevitable visit from the sheriff with his ominous sign and padlock.

It doesn't require a college education with courses in trigonometry, calculus and tensors to compute what happens when price cutting starts. An unwarranted reduction of $100 on a bill of goods simply means that additional volume to the extent of $2,500 must be sold if a net earning rate of 4 cents per dollar of sales is to be maintained. To put it another way a $1 price cut represents a $25 sale from the standpoint of lost profit. By the same token $1 of additional gross profit is the equivalent of $25 of additional business.

Profit is the only motive which justifies anyone being in or staying in business. When profits are literally thrown out the window through a price cutting policy in the hope that the additional business attracted will maintain the yearly profit rate, there is evidence of a serious lack of sound judgment. This theory is a delusion and a snare. Another example of simple arithmetic demonstrates why. To earn the same dollar gross profit where the gross margin is 25 per cent, volume must be increased 18 2/3 per cent to offset a 5 per cent price cut. If prices are cut 10 per cent the volume must be increased 50 per cent; to offset a 15 per cent cut, an addition 112½ per cent of new business must be secured.

If a little sober thought was given to these arithmetical truths, there would be less price cutting in the electrical business. And there would be more profits, more jobs and more general prosperity.

Re-Wiring Opportunity

WHEN Western electrical industry representatives met in San Francisco last month to discuss promotion of adequate wiring, they reached two general conclusions: new homes present no problem, provided some selling is done on the owner, the builder, the architect, the financing agency or any group of these. Old homes are something else again. To re-wire them to today's standards and today's needs for electrical convenience presents a multiplicity of difficulties, solution of which is a challenge to the best brains of the industry.

Momentary study of re-wiring business possibilities will indicate that every effort should be made to simplify code and ordinance requirements. The 1930 Census showed that there were 2,879,186 family occupancies in the 11 Western states. These 10-year old homes are almost all inadequately wired. Some need 10 outlets, others 30. If the lower figure is used as an average, then these buildings represent a potential demand for 28,791,860 outlets. If it is assumed that these outlets could be installed at a cost of $3 each, then this potential market for labor, contractors' service and wiring materials totals $86,375,580. If inadequate wiring is retarding the purchase of appliances for use in these homes, then there is an additional markets for many more millions of dollars of electrical equipment.

As the public accepts and insists upon a greater use of electricity and more appliances, the condition becomes more acute. Where the cost of providing additional outlets and wiring is high because of restrictions, substitutes in the form of cheap, unsafe makeshift methods and fixtures are installed, seriously overloading the existing wiring and creating a dangerous fire hazard. Policing these conditions is impractical and the inspector seldom has an opportunity to prevent them. The easier it can be made for the public to buy adequate wiring, the fewer hazardous conditions there will be. The public itself will be more conveniently served. Wiremen, contractors, dealers, wholesalers, manufacturers and utilities will benefit. The objective of the united industry should be aimed at revisions and uniformity in codes and ordinances to permit extensions and supplemental wiring in existing buildings by means of any wiring method and material approved for the purpose by the Underwriters and the National Electrical Code.

"We Have Had to Sell . . ."

THAT the time may never come here in the West when a private utility is forced to turn over its properties to governmental agencies as did the Tennessee Electric Power Company is the fond hope of everyone in the industry. On the day of that transfer Commonwealth & Southern Corporation ran full page advertisements under the heading "Tonight at Midnight we hand over our Tennessee Electric Properties and a $2,800,000 Tax Problem" in a few newspapers throughout the country. Courageous Wendell L. Willkie, who fought a losing battle with TVA, signed the ad. The public everywhere might well read this statement and ponder over the consequences of such a deal. Everyone in the electrical industry should read it. Here are excerpts:

We have had to sell our electric properties and turn over a splendid organization to the Tennessee Valley Authority and other governmental agencies because we could not stay in business and compete with virtually tax-free and heavily subsidized plants.

Incidentally, our taxes have been multiplying and mounting for years. They are an ever increasing problem . . . a veritable "headache," which other taxpayers can well appreciate. To be rid of any tax worries is, of course, always a relief.

We now turn over to government agencies, for about four-fifths of its real value, one of the finest public utility services in this or any other country . . . one representing private investments of about a hundred million dollars.

Almost all of the money we are receiving from this sale will be used to pay back the owners of the outstanding bonds and preferred stocks of The Tennessee Electric Power Company, at 100 cents on the dollar. A substantial percentage of these investors live in Tennessee. The common shareholders, principally The Commonwealth & Southern Corporation, are taking all of the loss.

To buy our properties, the municipalities are selling bonds largely tax-free and TVA is selling Government obligations which, in addition, will be a lien upon the incomes of all of us. These tax-free municipal and federal securities will be owned largely outside Tennessee. As a result, much income which citizens of Tennessee received from our company will no longer benefit this community.

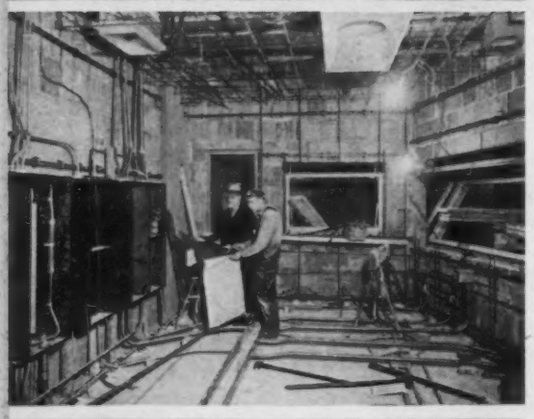
The incomes from all Tennessee Electric Power securities have, of course, been subject to taxation and have long helped to carry the costs of government. Whenever government takes over a private business, not only does the public lose the benefit of taxes paid directly by the business but also the substantial taxes paid by the owners of its securities.

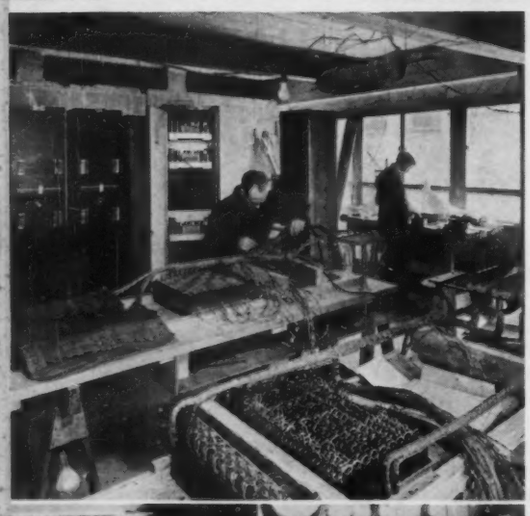
We sincerely hope that our former customers in this territory will continue to enjoy one of the best electrical services in the country.

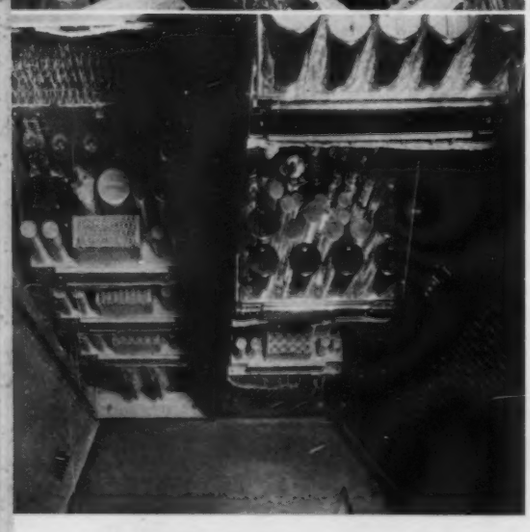
To numerous friends and associates in Tennessee, many of whom have been most helpful and considerate, we are deeply indebted and very grateful. We wish them every success. Our hope is that they will never be required to defend a business of their own against government subsidized competition.

There must have been a lump in Mr. Willkie's throat as he signed that statement. There was one in ours when we read it. With the same threat of government subsidized competition in sections of the West, we could not help but mentally insert other names and places and hope that it won't happen here.

They Specialize







RADIO and public address systems rely on accurate installation to insure continuous and noise-free operation. Unless the organization of the work is skillful, and the facilities ample few radio stations are willing to entrust the installation of sensitive sound equipment to a contractor. Buzzell Electric Works of San Francisco seems to have earned such a position for it has recently made the complete installation for Columbia Broadcasting system and KSFO in San Francisco and the radio and public address system for Golden Gate International Exposition.

A sidelight of interest is that three different systems of emergency power are provided the three places, KSFO's studio, its transmitter, and Treasure Island sound system. In fact KSFO was the first radio station to have emergency power supply at both its studio and transmitter, and it won a cup for continuous uninterrupted time on the air recently.

Without going into radio details some of the construction and installation requirements and a description of the emergency systems, because of their application to other similar problems, are worth consideration.

KSFO studios were built on top of a one story wing of the Palace Hotel, over its ballroom. To keep all external noise out the studios were made to "float" on an accoustical pad and then individually sound isolated from other parts of the building. From an electrical construction angle this required that electrical connections to the studios for lighting and sound equipment must be prevented from transmitting noise along the conduit system.

While rigid conduit was used for runs on the isolated studios connections to the conduit from the outside were made in flexible steel conduit. From the lighting control gang switches out flexible steel conduit was used too.

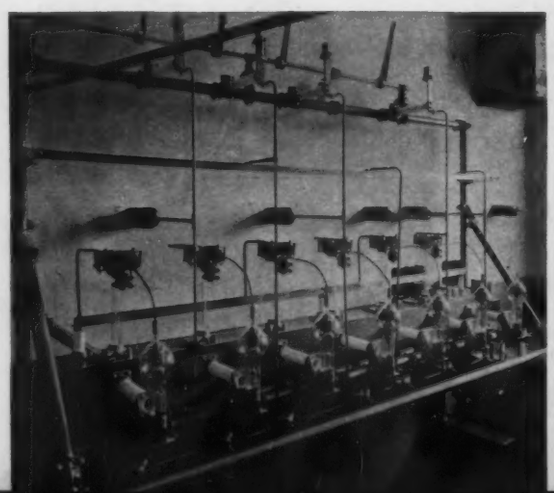
Even the in-built Holophane 200-watt units, mounted in the ceilings of the ceilings of the studios on 7x7-ft. centers were covered with an asbestos blanket to deaden possible sound reflection. Wiring to these units is asbestos wire to the panels, each unit having a circuit of its own.

There are two large studios with a capacity of 150 people, with a clients audition room off each. The main control room has a view into each studio through large double plate glass windows set on an angle to cut reflections and mounted in felt for sound proofing. The Carrier air conditioning system ducts are similarly insulated for sound.

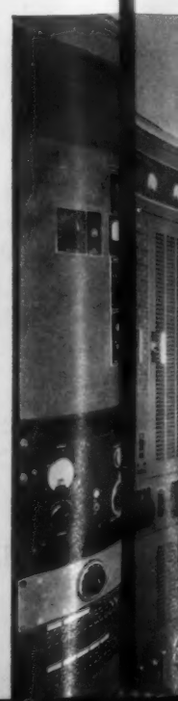
In smaller audition rooms the three-light lamps, 150-200-300 watts, are used in Westinghouse plastic fixtures.

Illustrations on this page show stages in the electrical installation at KSFO. In the master control room, (second picture from top at left) a wiring gutter serves the racks containing the audio and amplifying equipment. On the rear wall are metal cabinets for telephone and inter-communicating panels, rectifier controls and circuit breakers and relays. Windows into the transcription

Pictured at left, from top down: Mounting the Holophane in-built units into the ceiling of one of the studios. Entire studio floats in a pad of accoustical material. Next, the control room in the rough-in stage. Racks, shown being assembled in next picture, were later mounted over the wiring gutter shown on the floor. Complete shop was set up on the premises to assemble the radio equipment, wire and install it. Lower picture shows two finished rack sections as seen from above and at rear. Columbia and KSFO studios on roof of Palace Hotel, San Francisco



KSFO's 5-kw. transmitter is located on tide land near South San Francisco. At right is the rectifier rack, located in a locked room. Cylinder lock is electrically interlocked so that door cannot be opened until the power is shut off



ON THE COVER is a view straight down on the control center of the Columbia-KSFO studios on the roof of the Palace Hotel, San Francisco. Studios are visible through plate glass at each side. Control panel in front permits switching East, West to Hawaii, North and South

in Sound

room and wide windows overlooking the studios can be seen. The front cover shows the completed control room with racks at the rear, telephone board at the operator's right, teletype at left, and the main dispatching panel between the windows overlooking the two studios. From here programs may be routed to KSFO, North on the coast network, or south, back to the Eastern networks or West to Hawaii. In fact this is the control center for the Pacific Coast.

The transcription room is equipped with a recording head and turntables for cutting wax transcripts of programs to be made into recordings. A portable or field recording set is also kept here for ready use in the field.

Emergency power service is supplied the Palace hotel studios through an automatic changeover switch which cuts in the Palace Hotel's direct current from the hotel plant in the basement to a d.c. motor driving an alternator. If central station power fails the emergency system takes over instantly.

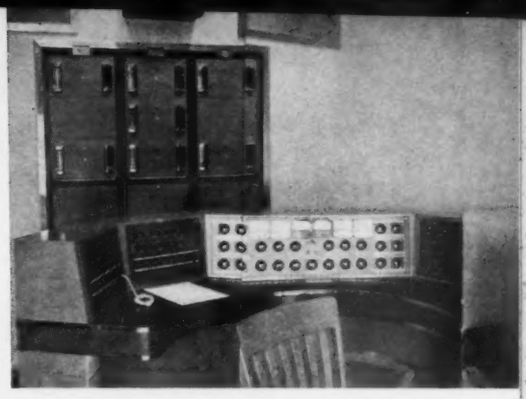
At the transmitter station, located on tideland in what is known as "butcher town," south of San Francisco, emergency power service is supplied by a Fairbanks-Morse 85 h.p. gasoline engine driving a 50 kva., 240-volt, 60-cycle alternator. Gasoline pumps feed it from a remote tank. Interesting is that the air conditioning system uses the water heated by the large radio tubes for the heating system, with auxiliary strip air heaters in the air ducts for colder weather.

Installation of the transmitter involved the laying of a widespread counterpoise system buried in the swamps surrounding the station and out into the bay. As with each of these jobs Buzzell moved a completely equipped shop to the site to handle the intricate wiring of the equipment. Shipped to the site in parts, Buzzell assembled and connected all the equipment. Many special tools and methods were developed for the job.

At Treasure Island the entire public address system was installed by this company. Speakers were located usually high above the ground in the walls of buildings, concealed by a screen. Speakers were located at 40 places, and so sectionalized that any group can be cut in or out from the main control room in the California Auditorium. This was done so that the music broadcast throughout the grounds can be cut off in sections where bands or other entertainment is being staged, so as not to interfere. There are also 32 remote pick-up points where microphones can be plugged in and an event on the ground picked up for radio broadcast.

Circuiting is arranged so that six programs can be sent out to as many as 6 different networks at once from Treasure Island.

Three broadcasting studios, a transcription room, and announcers booths are provided. The studios have large glass windows through which the public may watch from outside. All are located in the California Auditorium building. The auditorium itself, completely sound



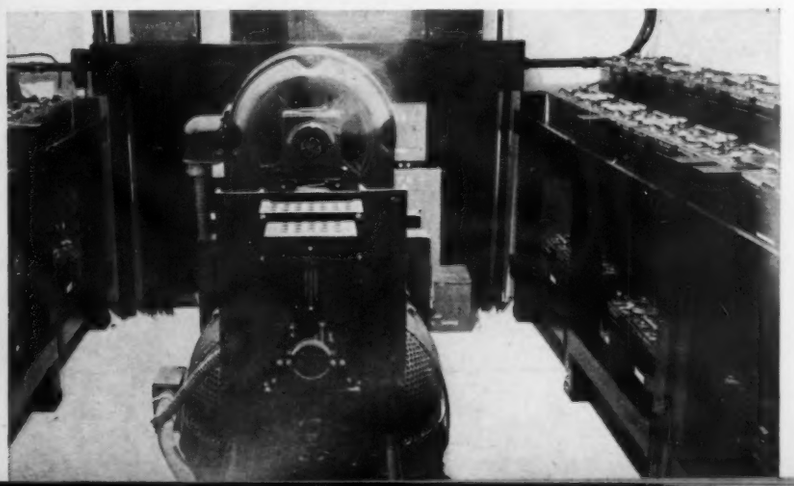
Public address control room at Treasure Island, with three racks at rear. Master control room is similar, with five racks

proofed, is claimed to be the largest sound studio in the world, containing 1,900,000 cu. ft. with a 300-watt monitor, the largest in the world. It has 9 microphones on the stage, plus three applause microphones in front of the stage, has its own glass fronted control room with two racks in it. A remote control line is also run to the middle of the auditorium.

Put in by the California Commission, the system also includes a sound system in the Hall of Western States, with 8 microphone locations, a control room with two racks; the state building also. Some conception of the intricacy of the installation is gained from the statement of Eugene Chaix, superintendent for Buzzell that more than 4,000 tickets were used for tagging the miles of shielded wires in pairs, and that more than 8,000 soldered connections made.

Emergency system used on Treasure Island is a new Es-B-Es development. It employs a 30.92 kw.-hr. storage battery, which, on failure of power supply, is cut in to run a d. c. shunt-wound generator as a motor at a lower speed, turning an a.c. generator and thus supplying 10 kva. of a.c. power for the radio system, plus 15 kw. of d. c. for emergency lights. Kuchel-Sievers Co. made this installation.

At left, front of the rack panels at KSFO transmitter. Below: Ingenious emergency power supply system for the auditorium and broadcast and public address systems at Treasure Island, supplying instantly 10 kva. alternating current and 15 kw. of d.c. in event of power failure. Storage battery drives the d.c. generator as a motor to turn an alternator so that radio tubes may be kept hot. Emergency lighting for the Follies auditorium at the Fair is insured also. Storage battery has a capacity of 30.92 kw.-hr., enough to operate the system for one hour



EHFA Promotion

Dealers in Puget Sound Power area use tie-ins successfully

Dealers in the territory of Puget Sound Power & Light Co. are getting excellent results from the use of identification posters, envelope stuffers, and price tags, furnished by the power company as a tie-in with the Electric Home and Farm Authority terms offered for financing dealer time payments. The dealers who are cooperating in the plan—and there are more than a hundred doing so—are supplied with a window sticker labeling them as an approved EHFA dealer.

A price tag, attractively printed in red, white and blue, and fashioned in the shape of a lamp globe, also displays the EHFA seal. On it is a space for writing the down payment and the monthly payments. The tag says, "Buy this appliance on easy terms; pay with your monthly electric bill."

Envelope stuffers can be used as circulars also. They give the reader information as to the Puget Sound Power & Light Co.'s offer to carry the terms on appliances purchased from the appliance dealer under EHFA financing. Billing is done at the same time as that of the electric service bill and goes out in the same envelope. Payments are usually made at the same time.

EHFA terms are available, the list indicates, on the following appliances: refrigerator, range, water heater, water pump, milk cooler, cream separator, clothes ironer, farm motor, washing machine, vacuum cleaner, dishwasher, waste disposal unit, feed grinder, milking machine, attic ventilating fan, radio, and portable space heater. Rural dealers have been particularly active in making use of this financing arrangement to sell farm-electrification equipment.

Envelope stuffers and "electric globe" price tags are part of Puget Sound EHFA promotion

EHFA
TERMS
To the Customers of
PUGET SOUND POWER & LIGHT CO.
Electric Appliance Purchase Plan Now Available Through Approved Dealers
EHFA
TERMS
To the Customers of
PUGET SOUND POWER & LIGHT COMPANY
BUY THIS APPLIANCE ON EASY TERMS: PAY WITH YOUR MONTHLY ELECTRIC BILL.
DOWN PAYMENT$ ____
MONTHLY PAYMENT$ ____

Agenda

Lighting and wiring items from Los Angeles to Vancouver

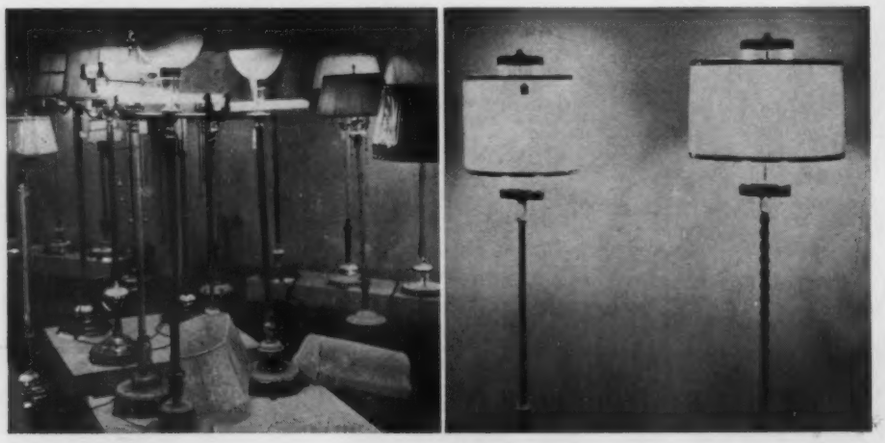
Striking demonstration of the life-saving function of sodium lights at street intersections in Los Angeles was contained in a paper presented recently by Jack Corlett, of General Electric Co., to the California Safety Council. Using figures released by Ralph Dorsey, traffic engineer for Los Angeles, he reported that installations at 25 Los Angeles intersections had reduced fatalities by 100%. The figures, based on average periods of 20 months before and after safety lighting, collectively showed reduction in accidents to be 84%, injuries 88%, city property damage 75%. As a particular instance, the installation at Glendale Boulevard and Effie and Allesandro sts., was the scene of 6 night accidents killing 3, and injuring 4, during 613 days prior to safety lighting. In 613 days after lighting, there were two night accidents. None was injured or killed. Cost of this installation is about 20c a night, including capital, depreciation and operating charges.

INSTALLED UNDER conditions ideal for fluorescent lighting was a job put in by Northwestern Electric Co., for Broadway Dyers & Cleaners in Portland. Ten 30-watt fluorescent lamps were installed for general illumination in a room already suffering from very difficult heating conditions. A second factor in favor of fluorescent lighting was the necessity of inspecting clothes for spots. Daylight fluorescent lighting quality proved ideal for this. A simple factory-type direct lighting installation was made.

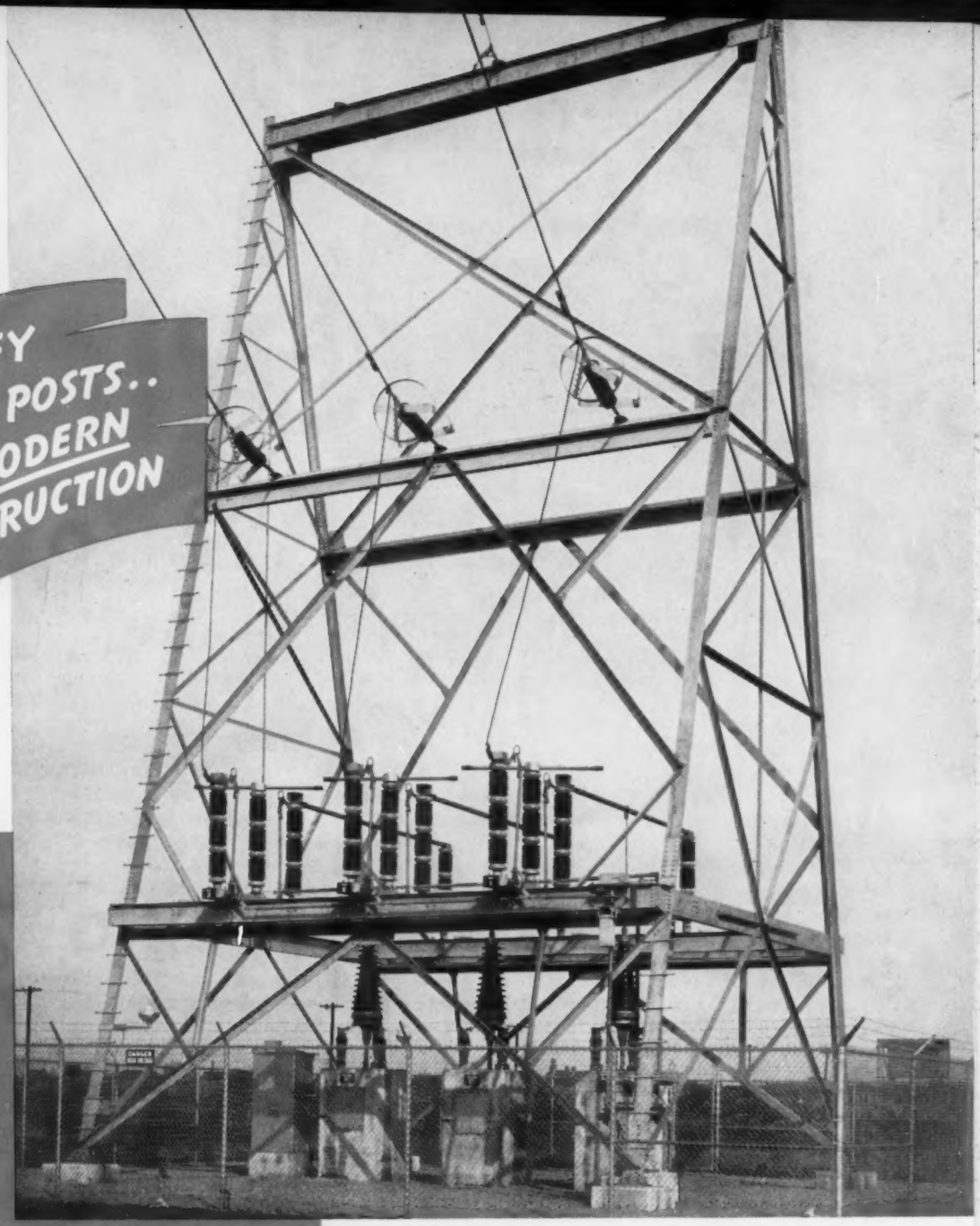
SECOND PUBLICATION of the Edison Electric Institute in a series of three, "Covered Neutral Cable Helps Sell Adequate Home Wiring" was distributed early in August. The 24-page booklet first sets forth the need for adequate wiring and then proposes the covered neutral cable as a means of selling more wiring. Substantiating information relative to field tests of this wiring material is graphically shown. Charts, pictures and drawings illustrate how the material can be used to advantage in wiring of homes.

LICENSE FEES for temporary installation of electrical illumination in Seattle will be reduced to one-half the regular rate, under an ordinance recently passed by the city council. The legislation will benefit chiefly downtown and community business centers, where the merchants decorate the streets with electrical designs during the Christmas season and special occasions. The fee will apply to installations that are to remain in place thirty days or less.

FREE PORCH LIGHTS permitted to burn day and night were the chief source of radio interference at Nelson, B.C., S. C. Jackson of Kamloops, Inspector for the Radio Branch of the Department of Transport recently advised the City Council. He recommended that a drive be instituted to persuade citizens to install switches for porch lights, and to have the lights turned off during the day. Jackson stated that on two recent inspection trips he had found on each occasion three porch lights which were causing trouble for blocks around. The interference from such lights would spread over a wide area, he stated.



To the left are a few of the new fluorescent floor lamps presented at the Fall Gift, Lamp and Housewares Show, San Francisco, Aug. 9-12. Represented here are (left) Milo Mfg. Co., San Francisco; (r.) Colonial Lamp Studios, Los Angeles



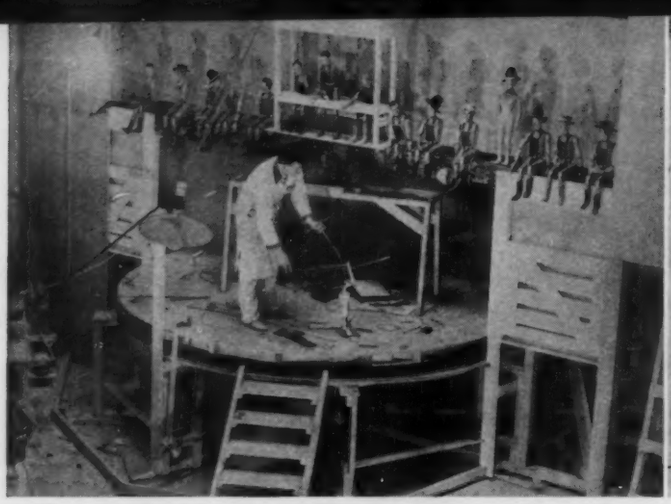
SPECIFY STATION POSTS.. IT'S MODERN CONSTRUCTION

LAPP

INSULATOR CO., INC., LEROY, N.Y.

YOU'LL SLEEP BETTER WHEN ALL YOUR SWITCHES ARE ON STATION POSTS . . .

If yours is the responsibility for keeping a system in operation, you know the continual worry about what is likely to happen next. How many lines will go out in the next lightning storm? Will those old switches operate with an inch of ice all over the station? Are you going to get flashovers on the insulators you haven't had time to get the dirt cleaned from? Engineers who have Station Post equipped switches under their charge tell us that they're great worry savers. The extra rigidity and impact strength of Station Posts make switches able to operate safely in all weather. Superior post design gives greater security in dirt conditions and under arcover. And a carload of switches on Station Posts won't cost a nickel more than the same thing on old-fashioned pin-types.



Rodeo by Robophone

By Leonard W. Mitchell

MARKING a new high in animation, a mechanical rodeo exhibit at the San Francisco Golden Gate Exposition is run entirely by electricity, which merely makes it necessary for the operator to turn on one switch to put the entire "show" in operation.

A "cast" of thirty-two miniature cowboys performs as the riders, ropers and champion bulldoggers at real rodeos. Each of the one-third life size mechanical figures is carved in wood to represent someone prominent in the rodeo game today. Such famous personages as Abe Lefton, famous rodeo master of ceremonies, Gene Autry, well known western movie actor and singer, are represented. Their real voices are recorded so that when their mouths move in exact synchronization with their talking or singing voice, unusual realism is lent the display.

The record - player - synchronizer, (Robophone) is turned on, producing the sound. First, an introducing voice describes the exhibit, etc., then introduces Abe Lefton, master of ceremonies. A circuit is made and a solenoid inside Lefton's head is energized from the output of a special amplifier so that variations in current passing through the loudspeakers, actuate a relay in the special amplifier, thus closing and opening the solenoid in Lefton's head. producing a movement in his mouth that is exactly synchronized with his voice as it comes from the record.

Lefton then introduces the various characters in the show and when introduced, each figure waves his arm in salute. This is accomplished by a solenoid built into each figure, so that when it is energized, the solenoid throws up that man's arm in salute. Robophone automatically makes and breaks the circuit for the various solenoids and an interrupter in series with the line causes alternate surges so that figures seem to wave exactly as though they were real.

Lefton goes on to describe the bucking horse act to be introduced and other rodeo contests and the hazards involved. Then the western movie star, Gene Autry, is introduced. Autry sings a song and he and two companions sway side to side and beat their feet in rhythm to his song. A motor is turned on at this point, causing the rhythmic motion. The mouth action of Lefton is switched to Autry so that his mouth is synchronized to move with his singing voice. His song done, the motor is turned off, the mouth action turned back on Lefton, and the bucking horse act is introduced. Three motors operate this, one to revolve the turn-table, one for the bucking horse, and one to operate the mule and Homer Holcomb, famous rodeo clown that ambles around the turn table behind his trained mule. With the start of the act, a corral gate that formerly hid the horse and mule from view suddenly swings open and the realistically bucking horse is revolved around the table slowly, describing a "pinwheel", "sunfish" and other gyrations peculiar to real wild bucking horses.

The bucking of the horse was accomplished by gearing a ¼-hp. motor to a powerfully kicking cam that alternately "kicked" against a lever on the horse mechanism, thus raising its hindquarters violently.

Next the exit of the horse through the entrance gate with Homer the clown, hanging onto its tail. Then Homer is tripped by levers so that he sits down quite suddenly as the mule abruptly kicks.

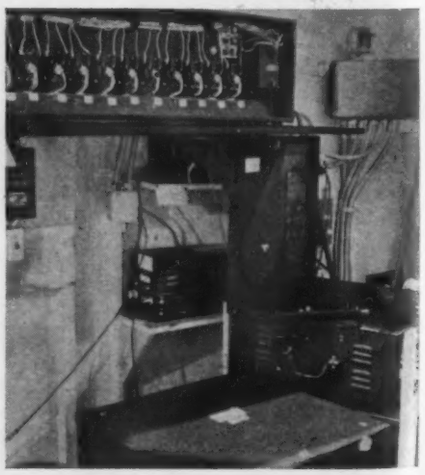
The turntable is stopped automatically when it reaches a certain point—one complete revolution—by a limit switch that is operated by a lever on the table as it reaches that point.

In all, there are five motors in the display, eighteen solenoids, and the master synchronizer—Robophone—that controls all of these circuits, turning them on and off at certain desired intervals as the 16-in., 15-min. recording is played.

The cowboys sitting on the fence are animated by a camshaft running the length of the fence, so that they are moving all the time, whether or not a show is being put on.

The display was built at the O'Dee Studio, 674 Jessie St., by Mr. A. O. Dinsdale, well-known western animation engineer. A year was spent in its construction, as this display is the most completely animated exhibit of its kind ever built. It was necessary for Dinsdale to study slow motion pictures of the bucking of wild mustangs to secure the correct articulation of his mechanical horse.

Pictured below are relays and the Robophone which operate the Levi Strauss rodeo exhibit



Glare-Free Lighting Speeds The Presses

Jim Richardson, pressroom foreman, Alhambra Post-Advocate, at work under new soft, glare-free lighting

ADDITIONAL proof that a satisfied customer is a prospect for further selling is shown in the newspaper press lighting installation in the plant of the Alhambra, Calif., *Post-Advocate*. In the forepart of 1939 (ELECTRICAL WEST, April '38, p. 49) the *Post-Advocate* composing room was relighted under the supervision of the Southern California Edison Co. using luminous hoods over make-up stones, proof reading tables and a linotype machine. From 30 to 60 ft.-candles of soft, glare-free light were provided by the ten fixtures, which were newly developed at that time. General room illumination also was increased to between 10 and 20 ft.-candles by the installation of twelve scientifically designed ceiling reflectors.

The outstanding success of this installation provided an open door for Willard Bausman, Edison lighting engineer in Alhambra, to extend his sales story to press lighting. Using their own experience as a basis, H. C. Burkheimer, *Post-Advocate* publisher, and Jim Richardson, foreman of the pressroom and stereotyping department, were readily convinced by Bausman of the need for better press lighting because of the fine detail work, especially on color, which is done there. Luminous slant hoods were designed especially for the job. The equipment was built by the Light Control Co., Los Angeles, and installed by the Ruebel Electric Co., Alhambra.

A number of problems were solved in the installation. The units had to be mounted under the 7-ft. 9-in. deck of the press; there must be no glare in the eyes of pressmen working either inside or outside the press; and the brightness from the glass panels must be of a low, well diffused quality.

The luminous hoods which were located at both sides and the exit end of the press have an 18.-in x 36.-in. face of flashed opal glass on a 60 degree slant. An insert from the top corner to the middle of the back makes a triangular reflector on the inside, with four sockets spaced for 60-watt lamps on 9-in. centers and 8-in. from the glass face. The flashed glass is clipped in the hood with felt lining, with hand holes at either end for relamping. The finish of the unit is aluminum lacquer. Five units are suspended from chains, and six are bolted to the wall with angle iron on top of the hoods. The hoods have a 6-ft. 5-in. clearance above the floor with a 2-ft. to 3-ft. 6-in. spacing between them. The placing of the units provides diffused light on all sides of the press cylinders and ink rolls. The two units at the exit end of the press are 8-ft. 6-in. above the floor.

The average brightness is 190 foot lamberts from the hoods. The intensity on the press cylinders varies from approximately 7½ to 18 ft.-candles. On the upper deck of the press, four reflectors with cover glasses use 100-watt lamps. Two similar units light the paper rolls area. A total of 3,840 watts was added for this installation.

Customer satisfaction is high on this installation. "The illumination at our press is an improvement over natural daylight," Burkheimer states. "Its soft, even quality, completely free of shadows and glare, helps pressmen work speedily and accurately."

Better lighting in newspaper offices is the subject of an advertising campaign being run by the Edison Co. in California *Publisher*, trade magazine of the California Newspaper Publishers Assn. The Alhambra press installation and other examples of lighting improvements are being featured in the series.

PRINTERS' APPRENTICES also will receive education on the value of lighting. Clark Baker, lighting counsellor for Pacific Coast Electrical Bureau, northern California division, has completed arrangements for classes with the San Francisco Club of Printing House Craftsmen. Four major lighting subjects, sub-divided into nine divisions, have been selected for their relationship of light and lighting to printing, paper, and ink. There will be four sessions, one a month for four months, held at Room 527, 447 Sutter St., through the courtesy of the San Francisco division of Pacific Gas and Electric Co. Included in the course will be a lecture on adequate wiring presented by Walter Heston, industrial engineer for the Bureau.

Electric Irrigated Farms Are Saving Money

ACCURATE cost and operating data are potent sales ammunition in building irrigation load. However, few farmers on moderately sized farms maintain sufficiently detailed accounts of costs to permit compilation of figures which will indicate the savings, the increased production and other benefits a prospective irrigator might obtain were he to install motor-operated pumps.

An exception is Bob Warrens whose 185-acre general farm is located in the Willamette Valley near Forest Grove, Ore., on the lines of the Portland General Electric Co. The farm has been irrigated since 1924 with both tractor and electric motor pumping. Water is conveyed in ditches, flumes and wooden pipes from the pumps, which draw from Gales Creek. Maximum lift is 70 ft. with most of the acreage having lifts varying from 30 to 70 ft. Initial installation in 1924 was an 8-in. 1,375-gal.-per-min. centrifugal pump driven by a tractor. In 1935 a 550-gal.-per-min. pump operated by a 10-hp. motor was installed. From accurate records Mr. Warrens determined that electric drive was more economical, so in 1938 the plant was completely electrified. The tractor was replaced with a 20-hp. motor and the existing electric pump increased to 750 gal. per min. by changing the pump impellor and installing a 15-hp. motor. Each pump is located adjacent to selected fields along the creek so as to irrigate maximum acreage without moving. Operated at rated efficiencies they will produce 2,175 gal. per. min.

Service for the pumps is provided by a 2,100-ft. 6,900-volt, 3-phase extension to the transformer location. Since the two pumps are 2,700 ft. apart, the transformers were set 1,350 ft. from each pump. Service drops to the 440-volt motors are No. 4 bare hard-drawn copper. A double throw switch is located at the transformer pole so only one motor may be operated at one time, thus saving on power costs by reducing the demand charges.

Annual operating costs based on a summation for 1938 in which generous allowances have been made by Mr. Warrens for depreciation are as follows:

Interest on irrigation investment (.06 x $2476.71)	$148.60
Taxes on irrigation equipment (estimated)	20.00
Depreciation on pump and motors (.05 x $983.85)	49.19
Depreciation on flume and pipe investment (.10 x $1027.45)	102.75
Depreciation on power line and wiring (.05 x $418.53)	20.93
Shelter	5.00
Insurance	5.00
Total annual fixed charges	$351.47
ANNUAL OPERATING COST	
1938 electric power used — 14,540 kw.-hr.	$290.27
1938 labor cost at 30 cents per hour	294.00
Irrigation equipment and power line maintenance	45.00
Total annual operating costs	$629.27
Total 1938 annual charges for irrigation	$980.74
Acreage irrigated in 1938	98
Total irrigation charge per acre in 1938 (of which the power cost per acre was $2.96)	$ 10.01

The two pumps are mounted on sleds, which makes them quite easy to move from the creek to the machine shed for storage and repairs during the winter season.

Mr. Warrens' farming practices consist of considerable rotation of seed and pasture crops. The total acreage and crops irrigated in 1938 were:

- 15 acres of ladino clover and grass
- 15 acres of canary grass seed
- 12 acres of potatoes
- 2½ acres of sugar beets
- 18 acres of harvested winter barley seeded to red clover for pasture
- 26½ acres of ladino pasture, hay and seed
- 9 acres of red clover seed

As only two dairy cows are kept on the farm, the pasture and hay requirements are principally for 100 to 150 ewes and their annual reproductions. Table I gives the acreage, yields, inches of water pumped, and other relative data on some of the irrigated crops in 1938.

As to the return from irrigation, Mr. Warrens states "irrigation will double the yield for the crops normally irrigated in the Willamette Valley. For some crops, there would practically be no growth or yield without irrigation, which is true for the red clover I sow in winter barley stubble. Parts of our fields are somewhat rough for flood irrigation.

"The cost of labor and power for irrigation averages approximately 5 per cent of our total gross cost of growing crops. In 1938 the seed cleaning bill on my 9 acres of red clover was higher than the irrigation season's labor and power costs for the red clover. On my 12 acres of potatoes grown in 1938, the irrigation labor and power costs were $175.20, while my dusting cost alone was $182.29 for the season. The fact is that the cost of sacks for the potatoes produced was almost as much as the total season's irrigation power and labor costs for the potato crop.

"The production costs, less fixed charges, on my 12 acres of potatoes grown in 1938 were:

Preparation of the ground	$83.00
Seed	58.50
Treating and cuting seed	26.53
Planting	40.85
Fertilizer	113.90
Dusting	182.29
Irrigation costs	175.20

"The total production costs per acre of potatoes were $56.69.

"The gross return per acre was 375 bushels at 60 cents per bushel, or $285.00. The irrigation costs for my potatoes in 1938 represented 5.8 per cent of my gross return from the potatoes, which had a low price in 1938."

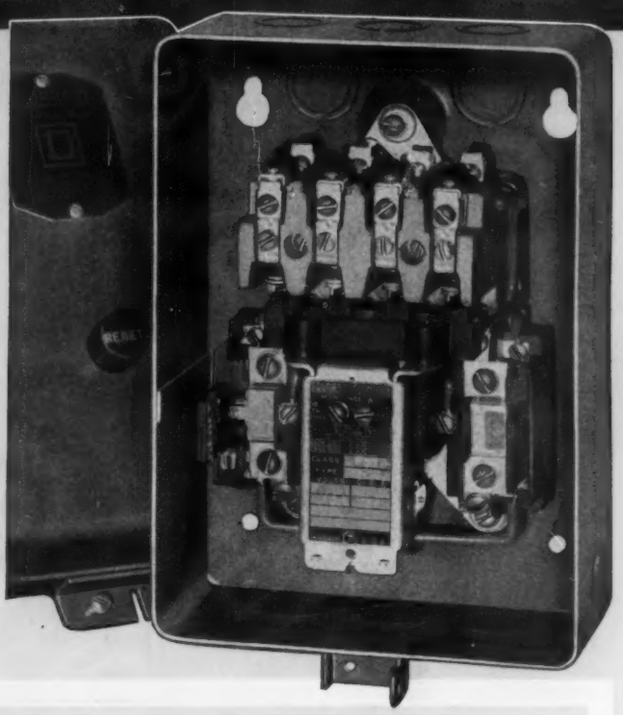
Table I—Data on Irrigated Crops, 1938

Acreage	Crop	No. of Irrigations	Yield lb. per Acre	Power Used Kw.-hr.	Inches of Water Pumped*	Motor Hours	Man Hours	Total Av. Head Ft.	Motor Size Hp.
20.0	Ladino Seed	2	150	1,990	21	139.0	139.0	30	20
6.5	Ladino Seed	2	150	1,700	28	110.0	110.0	60	15
18.0	Red Clover Pasture†	2	pasture	1,830	22	123.5	123.5	30	20
12.0	Potatoes	4	22,500	2,480	36	142.5	256.0	20	20
9.0	Red Clover Seed	2	845	1,460	30	90.0	90.0	20	20

† Red Clover was seeded after the barley crop was harvested.
* Calculated at pump.

Announces

A SMALLER AUTOMATIC STARTER FOR ALTERNATING CURRENT MOTORS

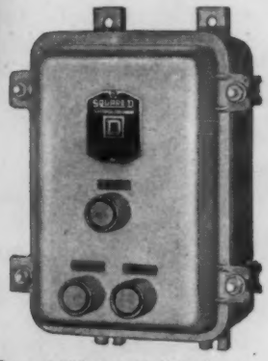


● The new Size O, Type R, is a smaller vertically operating starter in the Class 8536 line. It meets the demand for an automatic starter for the smaller sizes of polyphase and single phase motors. Maximum polyphase ratings are 2 H.P., 220, 440, 550 Volts; maximum single phase ratings are 1 H.P., 110 Volts or 1½ H.P., 220 Volts.

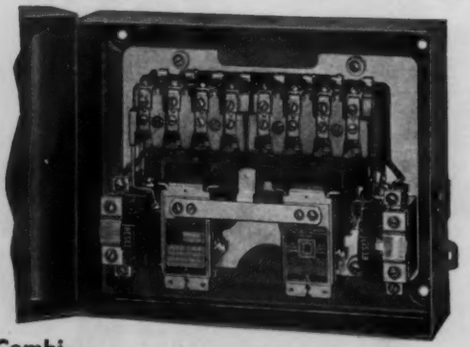
This starter has a vertically operating magnet, double break silver contacts and thermal overload relays. It is offered with general purpose, dust-tight, water-tight or Class II, Group G enclosures; also as a combination starter with either disconnect switch or circuit breaker; also in the reversing type.

(*Extreme Left*) Start-Stop push buttons in cover

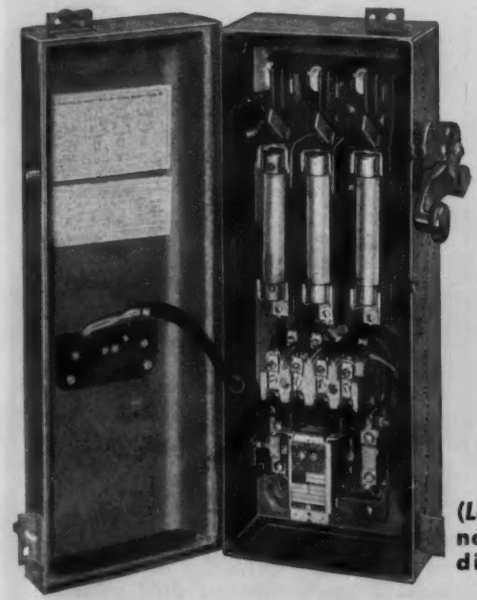
(*Left*) Three-Way selector switch in cover



(*Above*) Water-tight, dust-tight or Class II, Group G enclosure



(*Left*) Reversing automatic starter



(*Left*) Combination with disconnect switch

CALL IN A SQUARE D MAN

SQUARE D COMPANY

LOS ANGELES - MILWAUKEE - DETROIT

IN CANADA: SQUARE D COMPANY CANADA LIMITED, TORONTO, ONTARIO

NEWS OF THE INDUSTRY

PROVO MUNICIPAL POWER PLAN RUNS INTO SNAGS

Legal proceedings on several fronts have scrambled the movement for municipal power distribution in Provo, Utah. In addition to two citizens' suits questioning the authority of the city commissioners to proceed with the $850,000 project, Utah Power & Light Co. has filed suit in the federal district court seeking to prevent the city from expending money received from the sale of revenue bonds. In the meantime the city commission has proceeded to let contracts for machinery and plant construction and has made an offer for the outright purchase of the power company's distribution system, which has been refused.

The controversy, which extends back to October, 1936, when the original municipal ownership proposal was passed by voters by a narrow margin, has been in litigation almost constantly. In selling the bonds and issuing contracts, the city commissioners are acting on authority contained in an emergency ordinance passed at a time when both power company and citizens who are suing for an injunction contend no emergency existed.

Pending but never voted upon is a referendum proceeding to declare the entire project null and void. Also pending is a franchise election granting the utility a new franchise. City commissioners have refused to call elections on either of these proposals although petitions seeking them have been on file for several months. In surveys conducted by Utah Power & Light Co. 88% of all customers in the city were interviewed and of these 60% expressed a desire to continue to receive service from the company.

Citizens who are suing charge that the city administration is endeavoring to rush the city into municipal ownership by a hasty sale of bonds and by commitments to suppliers and contractors before voters have been given an opportunity to pass on either the franchise or the referendum.

THE BRITISH COLUMBIA ELECTRIC RAILWAY CO. is prepared to make commercial and domestic light and power rate reductions in Victoria, B.C., which will mean a saving of at least $40,000 annually to consumers W. G. Murrin, president of the company, told the City Council recently.

Fireworks Fizzle In Fair Fog

It's difficult to get a fireworks permit at the Golden Gate International Exposition. Only the 4th of July and special events are entitled to rockets bursting in mid-air. But the Illuminating Engineering Society was in town. The special events department at the Fair decided IES deserved a real fireworks display plus a searchlight scintillator drill.

So the IES group trouped to Treasure Island Aug. 21 for a look at rockets and roman candles. Clear weather of a week before had given way to thick pea-soup fog. At 8:15 p.m., off went the first rockets, skybound. Booms were heard, but no sunbursts of color, no falling, fading fire-stars. The thick blanket of fog soaked up the brilliant skyrockets. Disgusted, the Fair people gave up. But the searchlight display was never more effective.

HOOVER DAM ACT SHELVED UNTIL NEXT CONGRESS

All action on the Scrugham Bill to amend the Hoover dam act, chiefly in the interests of power users in southern California, has been definitely postponed by Congress until next session. A comprehensive plan for the development of the entire Colorado river basin has also been shelved.

This delay affords members of the Utah congressional delegation an opportunity to meet with the Utah members of the committee of 16 which drafted the bill, and work out an amendment which will protect Utah's new Colorado river-Great Basin project, and not retard its construction until a time when it may be included in a comprehensive plan.

According to members of the California delegation, Secretary Harold Ickes is insisting upon a change in the bill which would terminate all existing Hoover dam power contracts, and start anew on a different plan. He also wants the bill amended so that the Federal Government may operate the Hoover dam, just as it operates or will operate the Bonneville dam, and as it does at the TVA.

NEW P. G. and E. RATES BECOME EFFECTIVE

Rate reductions by Pacific Gas and Electric Co., saving 40,000 electric customers $250,000 per year, became effective Aug. 15 in 18 unincorporated towns and 28 built-up areas adjacent to cities. This is the last block of reductions in the $3,200,000 cut announced by P. G. and E. a month ago.

Utility engineers and the California Railroad Commission were kept busy for 18 months defining the areas outside cities which should be included in the new schedules.

Savings to domestic and commercial customers will average between 9.6 and 15.9%. Charges will be as follows for the indicated usages in kw.-hr. per month: 15—$122; 35—$2.04; 50—$2.44; 100—$3.79. Minimum charge remains unchanged at 60c per month.

Utah Power Cuts Rates

Reductions in electric service rates charged to residential, farm and commercial lighting customers of the Utah Power & Light Co. were ordered last month by the state public service commission. The new rates become effective Sept. 1, and will result in annual savings, based on present consumption, of approximately $225,000. Since it is the policy of the company to have uniform rates in both Utah and Idaho, reductions to Idaho customers will amount to a savings of $30,000.

Under the new schedule the following net rates will apply for residential and farm service:

For first 10 kw.-hr. of monthly use —75c; for next 50 kw.-hr.—4c per kw-hr.; for next 140 kw-hr.—2.5c per kw-hr.; for all additional use—1.5c per kw-hr.

The new commercial lighting schedule is 75c for the first 10 kw.-hr.; 4.5c per kw.-hr. for the next 1000 kw.-hr.; for next 1500 kw.-hr. 4c per kw.-hr.; for next 10,000 kw.-hr. 3.5c per kw.-hr.; for all additional use, 2.5c per kw.-hr.

Seattle Light Revenues Up

Seattle City Light revenues for the month of June were up 23% for commercial and 6.7% for residential power, and once again the municipal utility surpassed all records for a 12 month period, the June report filed with the City Council showed.

WATCH NORGE DEALERS

Go to Town!

The time is right . . . the NORGE line is finer than ever before at prices geared to the time . . . streamlined merchandising plans and "dealer helps" make the NORGE dealership worthwhile.

THE INDUSTRY'S *Biggest* OPPORTUNITY!

FILL IN NAME AND ADDRESS AND MAIL NOW!

NORGE DIVISION, *Borg-Warner Corporation*
Detroit, Michigan

Name_____

Address_____

City_____ State_____ EW-1

ARVIN

ELECTRIC FAN-FORCED

Circulating Heater

JUST THE THING TO SELL

CIRCULATES HEAT—employing efficient fan-distributing principle used in modern home heating systems.

PLUGS INTO ANY AC WALL OUTLET—heats air quickly, warming room all over.

SAFE WITH CHILDREN—because heating element and fan are enclosed. Won't burn rug even if upset accidentally.

EFFICIENT CONSTRUCTION—with air-intake louvers and quiet-running fan, behind heating element, to drive heat off wires and out into room.

for:

Bathrooms
Nurseries
Dens
Guest-rooms
Game-rooms
Sun-rooms
Trailers
Camp Cottages
Small Offices
Ticket Booths

For Baby's Bath and other uses where extra or temporary heat is needed.

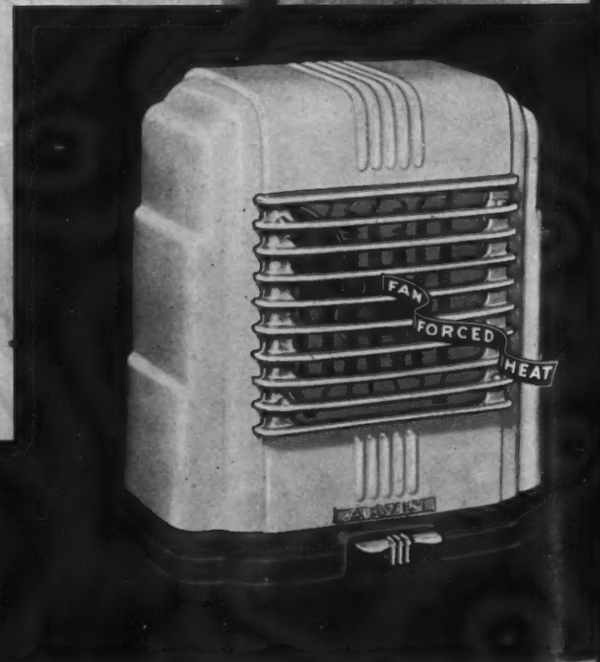
● **Advertising in Good Housekeeping, American Magazine, Better Homes and Gardens starts next month. Order your stock of Arvins from your jobber now.**

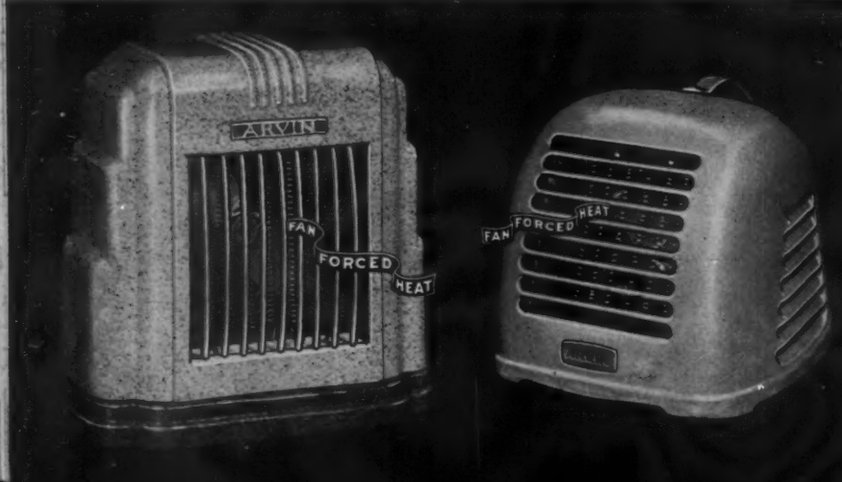
NOBLITT-SPARKS INDUSTRIES, INC., COLUMBUS, INDIANA
Also Makers of Arvin Car Heaters and Radios

Tested and Approved 1926 Good Housekeeping Institute

STANDARD MODEL 101
Two-tone Green Enamel Finish, Chrome Grille . . . . $7.50 LIST
Size of case—10" high, 9¾" x 6⅛" at base

JUNIOR MODEL 50
Green Morocco Finish. Streamline Design . . . . . $5.50 LIST
Size of case—7½" high, 6¼" wide, 10" deep





DELUXE MODEL 201A—Ivory and Maroon Enamel Finish, Chromium Grille . . . . . $10.50 LIST
Size—11¾" high, 10⅛" x 6⅝" at base

DELUXE MODEL 201—Tan and Brown Morocco Finish, Chromium Grille . . . . . $9.50 List

Two Deluxe models are identical except for finish. Toe switch makes it easy to turn heater on and off. Red indicator light, inside case, gives "fireplace glow" when heater is on—warns against leaving it on.

The department's revenues for the 12-month period ending June 30 were $6,047,762.11, an increase of $273,-510.64 over the corresponding previous period. The June revenue was $498,-016.36, an increase of $39,934.98 over June, 1938.

Total ranges on the lines reached a peak of 35,603, an increase of 2,480 over a year ago, while meters numbered 99,204, an increase of 2,467 over June 30, 1938.

Butte County (Calif.) Sues To Recover Municipal Funds

A suit is being prepared by District Attorney J. M. McPherson of Chico, Butte County, Calif., to settle definitely the two year old question centering around disposal of $18,000 of the dissolved Bidwell Municipal Utility District. This action is to be taken in lieu of the bill vetoed by Governor Culbert Olson which would have provided for the return of $18,000 to the county.

The Butte County Public Utilities Assn., with Frank Parker, Chico, president, has organized to create a new district to use Shasta dam power. This is in line with Olson's power policy in the Central Valleys project.

Hyatt Urges Creation of PUDS

California State engineer Edward Hyatt last month urged the creation of public agencies to distribute the power produced by the Central Valleys project. Hyatt said that due to the lack of competition, higher prices for power and irrigation water, depending on the price of power, would result if private utilities remained the only outlet.

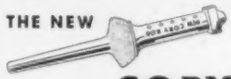
"Both Secretary Ickes and Reclamation Commissioner Page have said that it is the wish of the Government that such public agencies be established to obtain and distribute the electrical power," he declared.

Hyatt also quoted Governor Olson as saying that if private utilities obtain the electricity generated, prices would be exorbitant.

MEMBERS of the Woodbridge (Calif.) Grange, in a public debate concerning publicly owned utilities using power developed by the Central Valleys Project, stated that these utilities could be constructed for about half what private plants cost. They declared that at the end of twenty or thirty years the publicly owned plants can be paid for and be owned outright by the people.

Plain Hoss Sense
+ good basic quality
+ up-to-date design
= SUPERIOR
REG. U. S. PAT. OFF.
★ ★ PRODUCTS
THE SUPERIOR SWITCHBOARD & DEVICES CO.
CANTON, OHIO
★ Manufacturing ★
METER & RELAY TEST SWITCHES
METER & TRANSFORMER ENCLOSURES
METER TEST BLOCKS & TABLES

Streamlined Beauty! Easier to Clean!
★
LOWER CENTER OF GRAVITY!
THE CORY COFFEE BREWER
MARVELOUS TEA AND COFFEE UNTOUCHED BY METAL

New Models! Long Wanted Features!
Sensational NEW CORY Features are: Wider Decanter Neck (almost 3 in. across) for easy washing. Lower center of gravity! Matched fittings in Ivory-tone or Black bakelite. Every CORY Brewer offers these features: Two great filters; Bakelite Funnel Holder; Easy-grip handle; Bakelite Measuring Cup; Hinged Decanter Cover; Formed Pouring Lip. Many of the models are platinum decorated. All electric units are 2-Heat (Hi-Low). All glass is by CORNING. *Write today for latest catalog.*
BOTH CORY FILTERS (shown at right) ARE FAST
In making coffee, both limit contact of water and grounds to a short contact. Only the delicious, rich coffee flavor is extracted, untouched by metal. CORY Glass Filter ROD brews delicious tea, clear as amber, every cup the same.
GLASS COFFEE BREWER CORP.
325 NO. WELLS STREET • CHICAGO • ILLINOIS
Extra Value
THE NEW

CORY
GLASS FILTER ROD
IN ADDITION TO FAMOUS

"FAST-FLO" FILTER

Coast Utlities Help Army Build Tight Aircraft Defense

From the Mexico-California line to the northwestern tip of Washington, power companies along the Pacific Coast cooperated with the U. S. Army during the first week in August to set up a defense against "attacking" enemy planes.

Southern California's civilian aircraft warning service was put into action Aug. 1-3 under the leadership of Col. E. A. Stockton, commanding officer of the 63rd Coast Artillery, Fort MacArthur. Developed in southern California by army authorities and Southern California Edison Co. officials and engineers, the service has expanded to cover virtually all army defense areas, and to include the assistance of railway companies, sheriffs' offices, federal, state and county forestry services, branches of the naval and lighthouse services, to protect the coastal areas from attack by a theoretical invading air force.

Communication facilities to be utilized during southern California tests have been installed at the Alhambra communication center of the Edison company, which was the "nerve center" of the southern area maneuvers, held in a territory as large as the New England states.

More than 6,000 miles of inter-connected non-commercial lines composed of telephones, telegraph, carrier current and teletype, with the addition of public utility and army radio, were employed by the army in this area. The operation personnel reporting to the army message center at Alhambra and to March Field, Riverside County, included a civilian force of engineers, communication experts, power house and substation operators, linemen and forest service fire-lookout men.

Operation of the warning service does not interfere with the normal duties of the civilian force, nor does it require an intensive training course. During the tests, there were "alert" periods of several hours duration, during which observers were on the lookout for enemy planes, while carrying on their normal duties.

The Edison Company, with approximately 17,000 miles of power and light lines and nearly 6,500 miles of private telephone lines, is the nucleus of the warning service. Inter-connecting utilities include the Nevada - California Power Co., San Joaquin Light & Power Corp., San Diego Consolidated Gas & Electric Co., Southern California Gas Co. and the Santa Barbara Telephone Company.

Power company and army engineers are utilizing the newest discoveries in sound transmission detection and photographic science to build impregnable aircraft barriers. Through use of the cathode ray, engineers have reproduced visually the "sound track" of flying planes, enabling the detection and instant identification of planes at long distance over power lines carrying 60,000 volts.

P. G. and E. "Defends"

When all northern California became the center of this "army game," in August, Pacific Gas and Electric Co. also swung into action. Taking key parts in the northern California aircraft warning service, organized among non-military groups by the Army, P. G. and E. offered 7,500 miles of telephone line, which proved to be the backbone of the communications system. One hundred and fifty employees acted as lookouts at 55 out of 259 points scattered over northern California. In the P. G. and E. auditorium in San Francisco, pictured below, focal point of the service was centered. Here all messages ended, data coordinated and plotted and information dispatched. Visual evidence of proceedings was presented on a 12 ft. vertical map, provided with a lamp at each observation point, and used in conjunction with a panel which carried switches to operate the map lights and also indicated number, type, elevation and flight direction of planes being reported. Lighted lamps formed a trace of the flight.

Results were highly satisfactory to Brigadier Gen. H. T. Burgin, commander Ninth Coast Artillery District, whose anti-aircraft officers organized the warning service in the northern California area.

Northwest Area "Protected"

Tests of the warning service in western Oregon and western and central Washington were reported entirely successful, according to Major Frederick Lofquist, 3d Coast Artillery, Fort Stevens. Practically all large utility systems in the two states played their part, using operators of remote power plants and substations as observers. Utility communications systems transmitted the observations to a central point in the Electric Building, Portland.

Puget Sound Power Co. communications system also radiated to wide areas in western Washington with reports relayed to headquarters in the Electric Building, Seattle. A map, similar to the P. G. and E. map, was located there, marking the "advance" and position of the "enemy." Invading ships were spotted by 130 observers stationed at strategic points throughout the area. The average time elapsed for a report to reach headquarters was three minutes.

Men who did preliminary reconnaissance were Puget Power employees, holding commissions as army reserve officers. These men were Capt. Harley Bryant, Wenatchee; Capt. Marsh Duncan, Olympia; 1st Lieut. Irving Rowell, Major Robert Carlgren, 1st Lieut. Tom Black and 1st Lieut. George Tait, Seattle.

Focal point of communications systems of the northern California warning service was the P. G. and E. auditorium

Now Available

A NEW HINGED DOOR REFLECTOLUX

New Unit Reduces Service and Maintenance Costs

Here is a new advance in modern street lighting — a new hinged globe REFLECTOLUX and REFRACTOLUX line that further reduces maintenance and service costs.

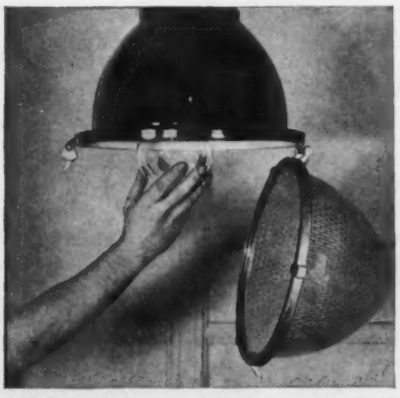
Now, for the first time, this extra advantage of the Reflectolux Senior Line is added to the REFLECTOLUX JUNIOR series. It is a sturdier unit, with rigid, cast aluminum globe holder. It is both dust-tight and weather-proof. The globe can be instantly freed for quicker, easier replacement of glass or lamp.

With These Advantages

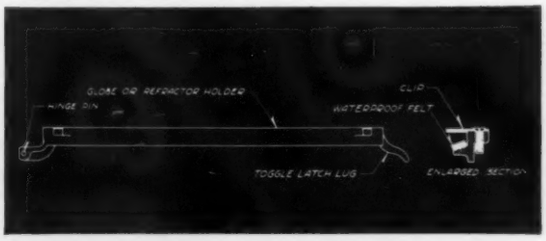
Quick acting, self-locking toggle-catch of die-cast brass. Sturdy hinge for greater safety. Weather-tight and leak-proof. Globe may be opened or closed with one hand, leaving the other free for maintenance and service work.

HERE'S HOW IT OPERATES

The new REFLECTOLUX JUNIOR reduces maintenance and service costs because both hands are free.



Street lighting maintenance men will welcome the fact that both hands are free for servicing.



Globe holder is hinged at one side and locked by easily operated toggle-catch at the other. Phosphor bronze clips hold the globe safely in place.

Westinghouse Lighting Equipment

Bonneville Activities; New Administrator Named

Dr. Paul J. Raver, long connected with the Illinois Commerce Commission and recently named its chairman, was appointed new administrator of the Bonneville project late in August. He will assume his duties Sept. 15, relieving acting administrator F. A. Banks, who has been serving on a temporary basis since May 4, shortly after the death of J. D. Ross, the first administrator.

Dr. Raver is a native of Indiana. and was graduated from the Univ. of Nebraska in civil engineering in 1917, received a masters degree in business administration in 1927 from Northwestern University, and a degree of philosophy from Northwestern in 1933. He worked until 1927 as a valuation and estimating engineer in Chicago. During the next six years he served as an instructor, assistant professor and associate professor of public utilities at Northwestern.

In 1933, he became supervisor of the section of rates and research of the Illinois Commerce Commission, organizing the section and directing special research on revenues, rates, cost of capital, corporate relations, etc. He also prepared testimony in important rate cases, and supervised the handling of all rural electrification issues for the commission.

Two years ago, Dr. Raver was appointed executive officer of the Illinois Commerce Commission. Although recently appointed chairman of the commission by Governor Horner, the Governor has consented to release him in order that he may take up his new duties at Bonneville.

Banks, who was drafted as acting administrator while serving as supervising engineer of the Bureau of Reclamation in charge of the construction of Grand Coulee Dam, will return to this work when Dr. Raver takes office.

New Revised Rate Schedule

The new rate schedule for Bonneville power which was submitted to the FPC by the Bonneville administrator July 22 was withdrawn Aug. 3 and a revised schedule was submitted for it. No changes were made in the rates, but as a result of conferences between FPC and the Bonneville administration, several changes have been made in the conditions of sale.

Most important permits purchasers using the so-called optional schedule of ½c per kw.-hr. plus 75c monthly per kw. of demand to change over at any time to one or the other of the kilowatt-year schedules.

A second change incorporates as part of the conditions of sale the section (5a) of the Bonneville act dealing with power sale; besides the requirements covered elsewhere in the conditions of sale, this section includes the sale of power to public bodies.

The newly submitted schedules maintain the rate of $14.50 and $17.50 per kilowatt-year for bus bar power consumed within 15 miles and for transmission line power. Both of these schedules permit public agencies to buy power at a flat rate of ½c per kw.-hr. during a two year development period. Dump energy is still to be sold at ½c per kw.-hr.

Wasco County Forms PUD

Another potential outlet for Bonneville power was created with the formation of the Wasco County PUD in Oregon, when voters approved the district on Aug. 15 by a vote of 1,735 Yes to 1,194 No. The district includes the town of The Dalles and the surrounding territory on the Columbia River above Bonneville. Two small communities, Dufer and Mosier, voted against the district and will be excluded. The territory incorporated in the PUD is served by Pacific Power & Light Co.

Just prior to the election F. M. Banks, acting Bonneville administrator, told voters that a 110,000-volt line would be built from the dam to The Dalles if the project carried.

Hood River PUD Barriers

While the Bonneville administration last month assured delivery of power to the new Hood River County PUD within a year, difficulties were foreseen in efforts of the district to begin operation.

The state hydroelectric commission had approved of the formation of this public utility district, which voted for it, and eliminated the city of Hood River. Legal opinion is divided on whether the new utility law gives the commission authority for such a step, even though the combined vote in the two areas was favorable.

A court test of the commission's decision was seen as a possibility. In the event that the district starts condemnation proceedings against the Pacific Light & Power Co., now serving that area, the company itself might test the ruling.

Of five directors elected for the district, two are not residents of the district as reformed by the hydroelectric commission. This was also seen as a legal loophole.

With Wasco County PUD voted, steps may be taken jointly by Hood River County to purchase the Pacific Power & Light facilities. This would include the Powerdale generating plant on Hood River.

Bonneville Survey Costs

Approximately $500,000 will be spent during the current fiscal year on surveys of new lines, which eventually will provide a power network of 1,400 miles of high-tension transmission extending to all major populated areas of the Pacific Northwest.

The project already has completed nearly 600 miles of surveys. The principal survey will be for a 230,000-volt circuit to Grand Coulee via Puget Sound. This line will be about 290 miles long, the longest high-voltage, alternating current line in the U. S.

Power Line Bids Open

With approval of a $2,000,000 WPA fund by the Washington state WPA office, first steps were taken Aug. 15 toward erection of a 220,000-volt line to extend across Clark and Cowlitz Counties, connecting the Bonneville substation at Vancouver with Kelso. Bids will be opened Sept. 13.

Completion of the line will permit the Bonneville super-power grid to carry Columbia River energy into southwestern Washington, much as the Vancouver-Eugene line, now nearly finished, taps a similar area in western Oregon. Both lines will stem from the Ampere substation. Plans are being drawn by Bonneville engineers for a substation at Kelso to handle a big power load there.

Bonneville Bill Approved

A bill placing the Bonneville project under the jurisdiction of Secretary of the Interior, and authorizing him to appoint an $8,000 per-year assistant project administrator was approved by the Senate early in August.

Engineer Urges Development

According to Ivan Bloch, Bonneville industrial research engineer, the Pacific Northwest is an almost untouched storehouse of minerals and hydroelectric power to which the chemical industries of the nation can profitably turn.

At the Western Chemical Congress in San Francisco last month, Bloch pointed out the immense deposits of raw materials that await development in Oregon, Washington, Idaho and Montana. In these states together, Bloch stated, there are 34 geological resources basic to industrial chemistry. Most are found within a radius of 500 miles of Bonneville Dam.

Detailed maps of these mineral deposits were made available to the chemical industry for the first time by Bonneville's acting administrator F. A. Banks.

HOT MONEY

YESTERDAY *one thief* stole more dollars from American Industry than *all* the "stick-up" men took from the public.

This industrial thief is FRICTION. His "hot money" is *your* money—represented in wasted power, rapid wear, costly delays and repairs.

To catch money-stealing Friction red-handed is the job of a group of scientists, engineers and technicians as skilled in their own art as are the "G-Men."

And these "friction-catchers" are at your service instantly, anywhere in America.

Shell keeps a force of them always ready. They are armed with friction-killing lubricants of numerous types and grades. And these Shell specialists have an enviable record for their *arrests* of friction. Thousands of big and little cases on big and little machines crowd their case-history files.

Call in the Shell lubrication man today. There is no charge for his help and no obligation to you.

SHELL

SHELL INDUSTRIAL LUBRICANTS

IT MUST BE RIGHT

smooth sailing with **TRIANGLE**

TRIANGLE PRODUCTS GO PLACES

Specify! **TRIANGLE**

AS SMOOTH AS A GUN BARREL!

EMT

Electric Metallic

TUBING

HOT DIP GALVANIZED! *Inside and Outside!* PLUS BAKED-ON LACQUER FINISH! *Inside and Outside!*

...AND IT COSTS NO MORE!!

TRIANGLE PRODUCTS REWARD BUYERS!

TRIANGLE CONDUIT & CABLE COMPANY, INC.

Horace Harding and Queens Blvds.
Elmhurst, New York City, N. Y.

Pacific Coast Division: C. C. Hillis, Vice-President in Charge of Sales, 390 Seventh St., San Francisco, California

Selling lamps and lighting in PORTLAND, OREGON

HERE'S the way General Electric advertising is constantly at work in Portland, promoting light-conditioning for Better Light-Better Sight. Into Portland homes every week goes a steady stream of G-E lamp and lighting advertisements amounting to 59 impressions per person in the last ten years.

IN 1939 . . . . . 1,470,000 magazines with G-E lamp advertisements and 528,000 radio messages.

SINCE 1929 . . . . 15,435,000 magazines with G-E lamp advertisements.

FALL 1938 . . . . . 727,690 copies of Portland newspapers with G-E lamp advertisements.

LAST 3 YEARS . . . 2,412,000 newspapers with G-E lamp advertisements.

SINCE 1929 . . . . 19,959,000 advertisements in magazines, newspapers, and radio . . . which is approximately 59 advertisements per capita.

AND FOR ANY CITY . . . Your own for instance, you can easily estimate the approximate number of lamp and lighting advertisements General Electric is delivering to your customers by applying the following national averages:

Going into the average wired home in 1939

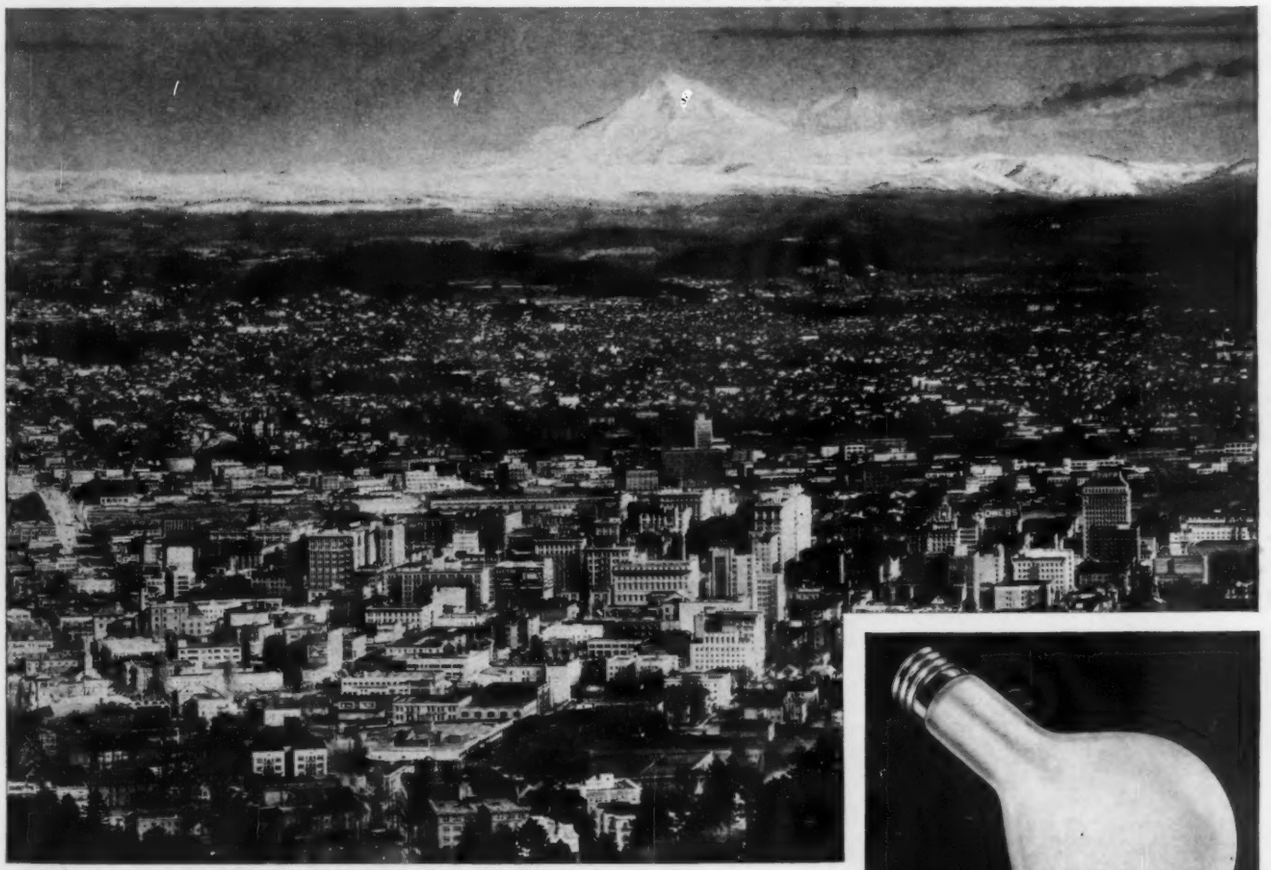
14 magazines with G-E lamp ads
5 newspapers with G-E lamp ads
5 radio messages
24 total advertising messages

• • •

In the last 10 years, the average wired home received

158 magazines with G-E lamp ads
30 newspapers with G-E lamp ads
20 radio messages
208 total advertising messages

View of Portland, population 337,183. Mt. Hood towers fifty miles in the distance.



G-E MAZDA LAMPS

GENERAL ELECTRIC

REA Activities

Extension of rural electrification lines 316 miles to serve 600 additional Whitman County (Wash.) farms is planned this year, according to D. I. Hopkins, president of the Inland Empire Rural Electrification. The projects, part of an approved building program for the cooperative, will cost an estimated $252,800.

TWO RURAL ELECTRIFICATION ASSOCIATIONS are being organized in Pend O'Reille and Stevens Counties in Washington, to obtain REA funds totaling $300,000 for construction of electrical lines in both counties.

COLUMBIA COUNTY RURAL ELECTRIC ASSN., Inc., Dayton, Wash., has been awarded $77,000 to build 69 mi. of line in Columbia County..

NEHALEM VALLEY COOPERATIVE ELECTRIC ASSN., Jewell, Ore., has been allotted $7,000 to build 11 mi. of line in Clatsop County.

SUN RIVER ELECTRIFICATION ASSN., Fairfield, Mont., awarded $26,500 to build about 24 mi. of line in Teton and Pondera Counties.

MISSOULA COUNTY ELECTRIFICATION ASSN., Missoula, Mont., has been allotted $110,000 to build about 90 mi. of line in Missoula, Granite and Powell Counties.

INLAND EMPIRE RURAL ELECTRIFICATION INC., Spokane, has been awarded $535,000 to build about 511 mi. of line in Whitman, Garfield and Spokane Counties.

RIVERTON VALLEY ELECTRIC ASSN., Riverton, Wyo., has been alloted $10,000 for wiring.

BENTON RURAL ELECTRIC ASSN., Prosser, Wash., has been awarded $104,000 to build about 92 mi. of line.

SOUTHEAST COLORADO POWER ASSN., Lamar, has been allotted $152,000 to build 165 mi. of line in Otero, Bent, Pueblo, Crowley and Prowers Counties.

Contracts Awarded

CONSTRUCTION of the 1st unit of the Los Angeles Bureau of Power & Light's 3d transmission circuit to Hoover Dam was begun Aug. 1. The unit now being built will extend from the bureau's Station "E" near San Fernando to the Victorville switching station, a distance of 71 miles. Its completion this winter will make available to Los Angeles an additional 50,000 kw.. When the line is completed to Hoover Dam next year, its full addition to operating capacity will be 150,000 kw. The total for the three circuits operated by the Los Angeles municipal bureau from Hoover then will be 390,000 kw., capacity of the two existing circuits now being 240,000 kw. The new circuit will transmit energy at 275,000 volts.

IMPROVEMENTS on the electric distribution system serving Dillon, Mont., were started last month by the Montana Power Co. Edwin R. Buck, local manager, stated that the project will take approximately two months. Lines along Dillon's streets and alleys will be rebuilt, lead-ins will be checked, poles will be inspected and new ones installed where necessary. Obsolete and inadequate equipment will be replaced.

TO T. Y. MCCLELLAN, West Stayton, Wash., for construction of 33 mi.-section of the 89 mi. power development by Cowlitz County, Wash., $33.517.

TO O. A. CARLSON ELECTRIC CO., Seattle, for construction of 104 mi. of line for the Clearwater Valley Light and Power Assn., Lewiston, Idaho., $88,038.

TO GRONEMAN & CO., Provo, Utah, for construction of brick power plant building, Provo, $48,189.

TO DONOVAN CONSTRUCTION CO., St. Paul, for construction of 133 mi. of li. for the Riverton Valley Electric Assn., $83,428.

TO CAHILL-MOONEY CONSTRUCTION CO., Butte, Mont., for construction of 120 mi of line for Fergus County Cooperative Electric Assn., $130,000.

TO WESTINGHOUSE ELECTRIC & MFG. CO., Portland, for a synchronous condenser for substation on Bonneville project, $165,870.

TO FRITZ ZIEBARTH, Long Beach, Calif., for an outdoor substation for Bonneville project, $62,054.

TO STANDARD ELECTRIC CONSTR. CO., San Francisco, for electrical work on San Mateo Union High School building, $10,254.

TO AMERICAN ELECTRIC CONSTR. CO., San for electrical work on general contract, city of San Francisco, $10,863.

TO S. F. RICKETT LTD., electrical engineers, Vancouver, the sub-contract for electrical work in a new $30,000 theatre.

ELECTRICAL TESTING LABORATORIES

Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory.

2 East End Ave. New York

TORK CLOCKS

NEW ELECTRICALLY DRIVEN 1939 MODELS NOW AVAILABLE

WITH PLAIN OR ASTRONOMIC DIALS

Whenever it is desired to turn Current on and off Regularly there is a new model Tork Clock that can do it.

THE TORK CLOCK CO., Inc.
MOUNT VERNON, N. Y.

Representatives:
A. R. Slimmon, 445 E. 3d St., Los Angeles
Nicholas & Cook, 1063 Howard St., S. F.
H. M. Sayers, 1019 Eastlake Ave., Seattle
Stevens Sales Co., 41 P. O. Place, Salt Lake City

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● COST of undisplayed classified ads is 5 cents a word, minimum $1.00 insertion. Box numbers in care of our San Francisco office count as 10 words additional in undisplayed ads. ● RATES per column inch of displayed ads is $3.75. ● All classified ads are payable in advance.

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Lamp Replacers
Lamp Base Removers
Cartridge Fuse Tongs
Switch Hooks

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THE G. C. A. Manufacturing Co.
Pittsfield, Mass.

★ *For Quick Service on Quality Products from Local Stocks*

Get in Touch with: **GEO. E. HONN CO.**

420 MARKET ST. SAN FRANCISCO, CAL.

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CAPACITATORS — Cornell-Dubilier Corp.
TRANSFORMERS, POWER AND DISTRIBUTION — Gardner Electric Manufacturing Co.
CURRENT TRANSFORMERS, NIAGARA AIR INSULATED — Lee Skipwith Company
CABLE GRIPS — Kellems Products. Inc.
CONNECTORS, GROUND ROD CLAMPS, UTILITY HOIST — Jasper Blackburn Products Corp.
GUY WIRE PROTECTORS, CONE ANCHORS, EARTH AUGERS — The Specialty Device Co.
GROUND LINE POLE AND GREEN WOOD TREATMENT — Osmose Wood Preserving Company
TONG TEST AMMETERS—LOW VOLTAGE GENERATORS — Columbia Electric Mfg. Co.
UNDERGROUND CABLE TOOLS & EQUIPMENT — T. J. Cope, Inc.
TREE TRIMMING EQUIPMENT
TREE SURGEONS' TOOLS — Bartlett Manufacturing Co.
FRICTION AND RUBBER TAPES — Clifton Manufacturing Co.
METER JEWELS — Herman D. Steel Company
SAFETY LINE TOOLS — Burnham Line Tool Company

R·I·P INSULATORS COST NO MORE

GUARANTEED *free from Radio Interference*

To both the engineer and the purchasing agent alike, Westinghouse R-I-P (radio interference-proof) Insulators are extremely important.

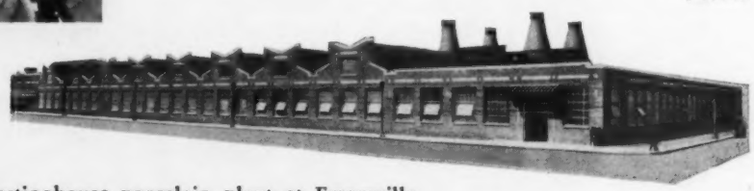
The engineer likes them because they actually do eliminate radio interference due to capacity arcs at the insulator itself . . . thereby eliminating a major customer complaint.

The purchasing agent likes R-I-P Insulators as a matter of economy. He knows that they cost no more than ordinary porcelain, yet do a far better and more complete job. Even more important, he knows that R-I-P Insulators do not require frequent, costly inspection . . . that they will give completely satisfactory service.

R-I-P Insulators require no added gadgets and contain no corrodible metal of any kind. Instead, a metallic oxide glaze is matured during normal firing and becomes a part of the insulator itself. It forms a correctly located high-resistance, conducting surface on the insulator . . . eliminating distressing corona, as well as troublesome radio disturbances due to capacity arcs.

Specify Westinghouse R-I-P Insulators. A nationwide network of supply depots provide overnight service. Porcelain plants in Emeryville, Cal., and Derry, Pa. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

J-05045



This Westinghouse porcelain plant at Emeryville, Calif., is the only porcelain plant on the West Coast. It makes all sizes of electrical porcelain for this area.

Westinghouse Porcelain

WESTINGHOUSE ELECTRIC

To E. J. Lynch Electric Co., San Francisco, for electrical work on general contract, city of San Francisco, $10,863.

To O. A. Carlson Electric Co., Seattle, for construction of 104 mi. of line for Clearwater Valley Light & Power Co., Lewiston, Wash., $88,038.

To Allis-Chalmers Mfg. Co., for 5 oil circuit breakers and providing independent terminals on 8 oil circuit breakers for Hoover Power plant, $564,509, and $99,230. To Westinghouse Electric & Mfg. Co., for 2 oil circuit breakers, $13,463. To I. T. E. Circuit Breaker Co., Philadelphia, for equipment for changing and extending bus structures in bus gallery and transformers, and similar equipment for changing and extending 23,000 volt bus structures in the oil circuit breaker rooms, $46,640, and $116,330. To Baldwin Southwark Corp., Eddystone, Pa., for 2 hydraulic turbines, $874,800.

To Fritz Ziebarth, Long Beach, Calif., for construction of Bonneville-Grand Coulee transmission line, $947,726.

To Langford Electric Co., Minneapolis, Minn., for construction of 173 mi. of line for Jefferson Valley Rural Electric Corp., Twin Bridges, Mont., $172,822.

To McLaughlin Construction Co., Livingston, Mont., for construction of 84 mi. of line for Park Cooperative Electric Assn., Livingston, $74,005.

To T. Y. McLellan, West Stayton, Ore., for construction of 32 mi. of line for Umatilla Electric Cooperative Assn., Hermiston, Ore., $23,147.

To T. Y. McLellan, West Stayton, Ore., for building 33 mi. of line for Public Utility District No. 1, Cowlitz County, Kelso, Wash., $31,517.

To Johnson Electric Co., San Francisco, for electrical work on Abraham Lincoln High School, San Francisco, $37,498; on George Washington High School, $24,867.

To Chas. W. Fettifer Co., Long Beach, Calif., for construction of hydro-electric plant at Drop No. 4, All American Canal, $308,466.

Southern Calif. Edison Puts Substations Into Operation

Two new sub-stations to increase service to Manhattan Beach and Balboa Island were placed in operation by the Southern California Edison Co. in August. The new Manhattan Beach substation has 1,300 h.p. of capacity and is of the outdoor, automatic type. Approximately $20,000 was spent in its erection. The Balboa substation has 1,000 h.p. capacity and is also outdoor and automatic. Located across the bay from Balboa Island, the station was connected to the area by a submarine cable, and a transmission line was built to the new station from the Edison company's Fairview sub-station about eight miles away. Cost of the new station, line and cable was approximately $30,000.

Construction was begun the first of August on another new station to meet increased demand in the city of Buena Park. This 1,000 h.p. station will be placed in operation Sept. 15. It is of the outdoor type and has about twice the capacity of the station which it will replace. Its cost will be nearly $20,000.

TRADE NOTES

Bowers Home Appliance Co., Salt Lake City, formally opened their new building recently, attracting 1,700 people to see the handsome new interior. The building has the latest developments in air conditioning and modern lighting, with an electrical appliance department headed by Ralph Beaver. Harold Bowers is owner and proprietor of this enterprising company, which in a few short years, has grown from a small washing machine store to one of Salt Lake's most progressive business organizations.

Illinois Electric Porcelain Co., Macomb, Illinois, has appointed the Henger-Seltzer Co., Los Angeles, as West Coast representative for its high tension insulators and specialties. Complete warehouse stock will be carried on the West Coast.

The McGraw Electric Co., manufacturers of "Toastmaster" products, recently issued a statement to all distributors to the effect that they will sell "Toastmaster" products to the consumer only through legitimate dealers. They are determined to keep their merchandise out of any mail-order catalogs other than regular dealers.

The Lapp Insulator Co., Inc., Le Roy, N. Y., has appointed the T. R. Routh Co., San Francisco, as representative for the San Francisco and northern California territory.

J. G. Pomeroy Co., Los Angeles, has been appointed to represent the Sterling Reflector Co. in southern California, southern Nevada and Arizona, taking over their new duties Aug. 1.

San Diego Consolidated Gas & Electric Co. has opened a new branch office on University Ave., San Diego, with Tom Dierdorff in charge. Show windows and floor permit a small display of featured appliances.

Signal Electric Co., San Francisco, has been appointed agents for Stanley & Patterson and Schwarze Electric Co., manufacturers of bells, buzzers, horns, telephones and public address systems.

Bart-Kinnison Co., San Francisco, has been named sales representative in northern California for the Babylon Lamp & Shade Co., Los Angeles. D. J. Bartelme is Bart-Kinnison manager, with offices in the Western Merchandise Mart.

More dealers are taking advantage of the home service advisors of Washington Water Power Co., for staging of range demonstrations and cooking schools in their own stores. Miss Shirley Ochs, during the past month participated in a 3-day Frigidaire cooking school for Jenson-Byrd Company of Spokane. She was later loaned to Puget Sound Power & Light Co. for cooking schools on Hotpoint, Monarch and Estate ranges for dealers in Bremerton, Enumclaw, and Auburn, Wash. Other sales training classes have been held at C. C. Anderson Co., Lewiston Furniture Co., Erb Hardware Co., Sears Roebuck, and Gamble's at Lewiston, Idaho, and for Montgomery Ward Co., at Pullman, Wash.

"A Half Century of Continuous Service" is the title of an attractive booklet issued by the Washington Water Power Co. Commemorating 50 years of WWP service in the Spokane area, 1889-1939, the book outlines the historical background of the company, shows the progress through the years, and concludes with a description of the inner workings of the utility. Pictures of the five presidents who have served through this half century are included, also a complete map covering the network of the company's system.

Moved

Crown Electric Co., San Francisco, moved from 153 Eddy St., to 477 Stevenson St.

P & J Electric Co., San Francisco, moved from 4 Leona Terrace to 651 Broderick St., San Francisco.

Herrick & McCormick, Los Angeles, moved from 8596 West Pico to 1550 South La Cienega.

Twentieth Century Refrigerating Co., Los Angeles, moved from 6636 Hollywood Blvd. to 2306 North Beachwood, Hollywood.

Johnson Electric Works, Hollister, Calif., from 535 San Benito to 317 7th St.

Gildner Electric Co., Portland, Ore., from 2010 N.E. Union St., to 826 South 7th Ave.

"But this piece must have HIGH MECHANICAL STRENGTH and I know we can depend on ILLINOIS PORCELAIN

WHAT YOU GET WHEN YOU SPECIFY ILLINOIS PORCELAIN

Exact Dimensions:

Modern facilities and rigid inspections take all of the guesswork out of their production, giving you exact dimensions regardless of size of porcelain or quantity ordered.

TOP QUALITY ELECTRICAL PORCELAIN:

Only specially selected, highest quality materials are used. Modern Illinois porcelain manufacturing insures balanced interior stress, homogenity of structure, high dielectric strength, and permanence of glaze.

HIGH MECHANICAL STRENGTH:

The original high quality of the materials used, plus our specialized process of manufacture, insures high mechanical strength in every piece we produce.

Manufacturers of electrical equipment know the importance of the porcelain and look for exact dimensions, top quality, and high mechanical strength. That is why you see Illinois Porcelain used on today's most modern electrical equipment. This porcelain gives manufacturers exactly what they need in quality to match the fine quality of their own design. Whether it is a need for the smallest special bushing or the largest special insulator, specify Illinois Porcelain for dependability.

Write to Illinois for your immediate requirements. Ask for catalog.

Standardize on

ILLINOIS

FOR TOP QUALITY AND EXACT DIMENSIONS——

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

THE HENGER-SELTZER COMPANY, LOS ANGELES, CALIFORNIA IS READY TO SERVE YOU

ABOUT PEOPLE

Personnel Changes Made In G-E Pacific District

Several changes in responsibility in the General Electric Pacific District sales organization have been announced by commercial vice-president, R. M. Alvord. Involved in these personnel shifts, are the following:

R. E. Jerauld, former manager of the Phoenix office, has been transferred to the Los Angeles office as assistant to the manager, S. E. Gates. Jerauld has been with the G-E organization since 1905. He graduated from California Institute of Technology in 1902. After several years in the Salt Lake City office, he was transferred to the Phoenix office where he has been manager since 1925.

G. F. Maughmer succeeds Jerauld in Phoenix. Prior to his transfer, he was in the industrial and central station departments of the Los Angeles office. His G-E career began in 1923, when he entered the test department at Schenectady. Subsequently, he was located in the Los Angeles office from which he was transferred to the Phoenix office in 1925, returning a few years later to the Los Angeles office where he has continued until his recent transfer to Phoenix.

Fred Garrison, of the Los Angeles central station department, has been made Pacific District meter specialist. Garrison was graduated from the University of Nebraska in 1917 and joined G-E in the same year. His experience includes work in the various engineering departments at the general office, and in the Los Angeles central station department since 1927.

C. R. Benson has been promoted from the San Francisco office meter and transformer specialist to the position of official representative of the transformer department, with headquarters at the Oakland works. A Stanford electrical engineering graduate, he entered the G-E test course in 1926 and was assigned to the San Francisco office in October, 1929.

Stanley W. Scarfe, formerly assistant to commercial vice-president Alvord, goes to Los Angeles to succeed Garrison in the central station department. Following graduation from the University of California in 1924, Scarfe went to Schenectady on test, returning to California in 1926. Prior to coming into the San Francisco office in 1937, he was located in Sacramento as G-E sales representative.

J. C. Porter, transformer specialist in the Los Angeles office, has been moved to San Francisco where he becomes Pacific District transformer specialist. He joined the G-E organization in 1922, after graduation from the University of Illinois. He came to Los Angeles in 1928 and has been transformer specialist in their central station department.

Dostal New Pacific Coast Westinghouse Sales Manager

Charles A. Dostal has been appointed manager of sales of the Pacific Coast district of Westinghouse Electric & Mfg. Co., according to Ralph Kelly, vice-president in charge of sales. Dostal will relieve William R. Marshall, vice-president, who has been in charge of the district since 1928, of managerial duties incident to his position, so that Marshall may devote full time to sales interests in the Pacific district.

Dostal has been with Westinghouse for 33 years, as a sales executive in the Philadelphia, St. Louis and Chicago offices of the company. Since 1931 he has been manager of the Northwestern district merchandising division with headquarters in Chicago. *(See Profiles).*

P. G. and E. Promotes Three

O. R. Doerr has been appointed general sales manager of Pacific Gas and Electric Co., assuming his new duties Sept. 1. Doerr has served as chairman of the general office sales committee, acting as coordinator of sales activities of the organization.

A native of Missouri, he attended St. Louis University, later joining the Navy during the World War. He graduated from the Naval Academy at Annapolis, retired from the service in 1921, joining the Great Western Power Co. in San Francisco. Upon consolidation with P. G. and E., he was placed in charge of refrigerator sales, served as supervisor of domestic lighting, and at one time was in charge of commercial lighting.

Walter D. Howell, of the P. G. and E. East Bay sales department, has been transferred to the general office in San Francisco. He succeeds W. H. Park and will be in charge of industrial power work formerly handled by Park.

A graduate in engineering of University of California, Howell has spent 15 years in the electrical industry. He began with Westinghouse Electric Supply Co. (then the Fobes Supply Co.) in San Francisco in 1924, leaving to go with P. G. and E. in Oakland in 1926. There he was employed in various phases of the company's operating and engineering activities.

W. H. PARK has been named manager of the Berkeley-Albany office, P. G. and E., succeeding the late Henry W. Beekman, who died suddenly Memorial Day. Since 1929, Park has been industrial sales engineer in the San Francisco general office. He first joined the company in 1920 at Modesto, serving in the line department. Four years later he left to enroll at the University of California and rejoined the company upon his graduation in 1928.

JAMES B. BLACK, president of Pacific Gas and Electric Co., has been elected a director and member of the executive committee of the Southern Pacific Railway. He is one of a group of westerners elected to the directorate coincidental with the moving of the railway's executive offices from New York to San Francisco.

J. HENRY CONOVER, chief clerk for Washington Water Power in the Colfax district, will change places this month with C. Jones, WWP chief clerk at Coeur d' Alene, according to Victor S. Casebolt, district manager.

WATT L. MORELAND was elected president of the Los Angeles Board of Water & Power Commissioners at their annual organization meeting, July 27. Franklin D. Howell was named vice-president.

R. L. CLARK of Bodine & Clark, a Portland, Ore., livestock commission firm, has been appointed one of the three trustees of Portland Electric Power Co. of that city to succeed L. M. Scott, who recently designed. The other two trustees are Thomas W. Delzell and Franklin T. Griffith, president of the company, who is operating trustee. The company is in the process of financial reorganization through the Federal court.

GRAYBAR takes pride in the completeness of its service of electrical supplies—a service to the whole community. Every electrical need of industry, office, and home can be filled from Graybar's list of 60,000 electrical items.

At the same time, nearby Graybar warehouses make these electrical products quickly and conveniently available...when and where you want them. And Graybar's 69 year reputation for quality assures dependability in every electrical product.

Finally, Graybar's service of distribution saves buyers' energies and time...makes heavy reserve stocks unnecessary...coordinates delivery and assembly of stocks. Call on Graybar ...for *everything electrical!*

OFFICES IN 83 PRINCIPAL CITIES EXECUTIVE OFFICES: GRAYBAR BLDG., NEW YORK

G-E Lamp Appoints Robinson Asst. South Pacific Manager

W. H. Robinson, Jr., has taken over his new duties as assistant manager of G-E Lamp Dept.'s South Pacific division at Los Angeles. He succeeds L. R. Wilson who is now North Pacific division manager at Portland.

For the past three years, Robinson has been in charge of South Pacific's studio lighting and lamp sales in Hollywood. He graduated from Massachusetts Inst. of Technology, joining G-E's street lighting department at Lynn, Mass. in 1925. During the next ten years, Robinson was engaged in special lighting sales work for G-E in Schenectady, N. Y., Chicago and Los Angeles.

ELWOOD BACHMAN, Provo, Utah, has been appointed electrical engineer of the General Electric Salt Lake City office. Bachman was in charge of G-E activities at Hoover Dam, both during the construction and since dam operations. He was educated at Brigham Young University and the University of Utah, being assigned to the G-E Salt Lake City office in 1920 as a salesman.

Prior to this promotion, which became effective Aug. 1, Bachman acted as sales engineer. His new territory encompasses Utah, southern Nevada and parts of Idaho and Wyoming.

LLOYD R. HANLON is now associated with E. Lloyd Sutton as a co-partner representing the following lines under the firm name of Sutton & Hanlon: Universal Cooler Corp., Detroit Vapor Stove (Div. Borg-Warner Corp.), Majestic Radio & Television Corp., American Ironing Machine Co., Middlebury Electric Clock Co. Headquarters are in the Western Furniture Exchange, San Francisco. An office will also be located in Los Angeles.

LEM V. BRANSON, California Refrigerator Co., has been named manager of the company's new Oakland store. Branson serves as sales manager and assistant engineer, and is in charge of sales promotion.

E. P. MARKEE, manager of the South Pacific Division of General Electric Lamp Dept., has been elected a director of the Sales Managers Assn., Los Angeles.

J. M. TENNEY, formerly Norge Western division sales manager, has been made assistant sales manager in charge of all business development activities. His headquarters will be at Detroit.

KENNETH WILSON has been named manager of the electrical appliance department of the Crescent department store, Spokane. A graduate of Washington State college, Wilson was a former member of the Crescent sales staff.

HARRY WALKER is new manager of Breuner's store in Berkley which is enlarging its stock of refrigerators, radio, and other appliances.

Deaths

J. W. TWELVES, 69, assistant treasurer of the Utah Power & Light Co., died Aug. 4 at his home, Salt Lake City. A pioneer in the Utah power industry, Mr. Twelves began his career in May, 1897, when he became associated with the old Telluride Power Co. He served as construction foreman on the 1st 40,000-volt high tension power line in the world. He came to Utah Power & Light as cashier and accountant, and was appointed assistant treasurer in 1929.

GEORGE ELLETT, 79, oldest employee of the Utah Power & Light Co., died in Salt Lake City Aug. 4 at his home. He had worked for the power company for 56 years. His last assignment was at the Jordan plant, where he was an operator.

ROY B. ASHBROOK, communications engineer of the Southern California Edison Co., died suddenly Aug. 15 from a heart attack. He was a veteran of 26 years in Edison service, having joined the company on April 16, 1913.

WILLIAM SAVILLE, 65, for 21 years general secretary, British Columbia Electric Railway Co., died recently at his summer camp at Grantham's Landing. Mr. Saville was born in England and came from Leed's Yorkshire to Vancouver in 1911, in which year he joined the company's accounting department. He was in the payroll department until 1915 when he became chief clerk in the general manager's office. In 1917 he was appointed comptroller.

BARNEY ROSENBERG, proprietor of Inland Lighting Co., Fresno, fixture house and electrical contracting firm, died late in July. The business is being operated temporarily by Mrs. Rosenberg.

Stocks at San Francisco
Electrical Specialty Co., Inc.,
316 Eleventh Street

Stocks at Los Angeles
Electrical Specialty Co. of So. Calif.,
451 South San Pedro Street

Stocks at Seattle
Electrical Specialty Co., Inc.,
714 Fourth Avenue

For the Coast Trade

At your doorstep you now have an adequate stock of popular D-H alloys, wires, ribbons, rods and other forms.

Driver-Harris Company
Harrison, N. J.

TRADE MARK REG. U.S. PAT. OFF.
Nichrome

From Aircraft Ignition Cable to

PLAIN RUBBER CORDS

OVER 60 TYPES OF ROEBLING ELECTRICAL WIRES AND CABLES

Rubber Covered Wires and Cables: Code; Performance; and Heat Resisting; Plain Rubber 60% sheath Power Cable and 40% and 60% sheath Flexible Cords

Power Cables: Paper; Cambric; Rubber

Parkway Cable, metallic and non-metallic

Service Entrance Cable

Slow-Burning Wires and Cable

Weatherproof Wires and Cable

Police-Fire Alarm Cable

Appliance Cords

Annunciator and Blasting Wire

Network Cables

Magnet Wire

Welding Cables

And a wide variety of other wires and cables; either Standard or to Customer's Specifications

QUICK SHIPMENT

Prompt Service is available at all offices and warehouse points listed below, where large stocks of a wide variety of standard Roebling Wires and Cables are always on hand. Your request for information, prices or samples wil be welcomed.

JOHN A. ROEBLING'S SONS CO. OF CALIF.
San Francisco, Los Angeles, Seattle, Portland

IF IT'S ELECTRICAL WIRE OR CABLE **ROEBLING** HAS IT!

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PROFILES OF THE MONTH

New manager of sales of the Pacific Coast district of Westinghouse Electric & Mfg. Co., is Charles A. Dostal (left) with Westinghouse for 33 years. H. S. "Bud" Schuler (right) recently was appointed sales promotion manager of the same district with headquarters in San Francisco

Mike Sweyd of M. Sweyd & Son, San Francisco, was recently elected national president, Associated Pot & Kettle Clubs of America

Seated in his new office in the Western Merchandise Mart, San Francisco, is Fred Fenton, Easy Washer Machine Co. regional manager

Standing in front of T. L. Rosenberg's new Oakland store, are (left to right) Bud Schuler, R. J. Holterman, William L'Hommedieu, W. H. Wolff, T. L. Rosenberg, Kenneth Knopf, Clyde Williams, Bruce Brownlea, Robert McDonald, Frank Mills, Harry Tiderman, E. C. Hiester and A. L. Geen

Preview of coming campaigns by

P·G·and E·

PACIFIC GAS AND ELECTRIC COMPANY

ELECTRIC APPLIANCE SOCIETY OF NORTHERN CALIFORNIA

1939

BETTER LIGHTING PROMOTION

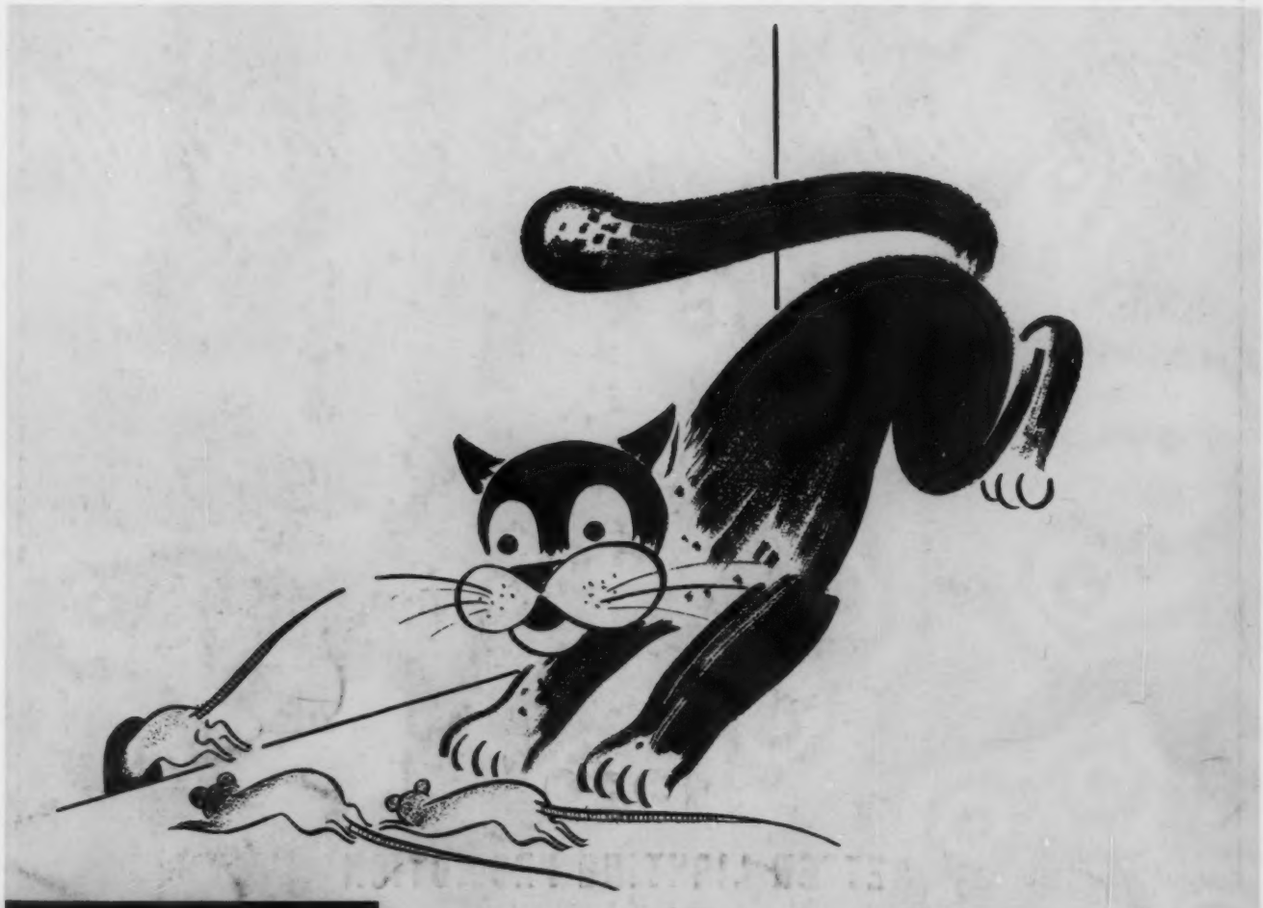
With vacations over and children back at school and the days rapidly getting shorter, the logical promotion for the coming month is **lighting**—"better sight" floor and table lamps, new and improved ceiling fixtures, larger bulbs and various devices for shading and diffusing light.

The P. G. and E., as usual, will stress the **benefits** of good lighting, leaving to dealers all mention of specific makes, styles, prices, terms and so on.

Copies of our three lighting ads together with another ad on wiring may be obtained from your local newspaper. When you read them, we think you'll agree that any dealer copy would be materially strengthened if published along side.

DEALERS: By watching this page from month to month you can keep informed of sales promotional campaigns to be sponsored by the Pacific Gas and Electric Company and the Electric Appliance Society. Detailed information will be supplied, as usual, through the mail. If such information is not received, call our local office or write Electric Appliance Society, 1355 Market St., San Francisco, Calif.

EW 109-939



MORE OUTLETS NEEDED

9-39

A home with too few electrical outlets is like four-lane traffic on a one-lane highway. The homeowner cannot obtain the full use and benefits of the appliances owned, and there just isn't space for new appliances. The principal requirement of every new home should be adequate wiring with sufficient outlets. It means the convenience of modern electrical living to the owner—and maximum profits to the contractor, appliance dealer, and entire electrical industry.

PACIFIC COAST *Electrical* BUREAU

447 SUTTER STREET, SAN FRANCISCO • 601 WEST 5TH STREET, LOS ANGELES